ELECTRICAL REVIEW

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The Export Plan

Electrical Industry's Will and Ability

THE country has already learned what is being done negatively (i.e., by cuts in imports) to save £228 million of the current deficit of £600 million a year on our trade balance. Last Friday Sir Stafford Cripps dealt with the positive measures proposed by the Government. In doing so he went over the gloomy facts with which we are all now so familiar, but he concluded with an expression of confidence that the nation was able to pull through if the will was there.

What is Called For

The report on page 457 of the speech, which lasted an hour and a half, is necessarily sketchy but it sets out the principal points and shows the part which the electrical industry is expected to play. Briefly, exports as a whole have to be increased by a third over the level of the last quarter of 1946—with the necessary adjustment for rising prices. Because some branches of industry cannot be called upon for so much more, others must contribute a larger proportion. The electrical industry has already raised its exports further above the 1938 level than most others. Presumably because of this and on account of the need for electrical plant and equipment by productive industry in this country, the targets set for the two main classes, machinery and apparatus, are below the one-third increase.

Exports of electrical machinery figure prominently in the list; the target to be reached by the end of 1948 in this case is £2·1 million a month against £1·62 million a month in the last quarter of 1946—an increase of 29 per cent. Electrical goods and apparatus, as a class are expected to rise from £3·82 to £4·30 million a month, or about 12½ per cent. No increase in cable exports is anticipated in the Board of Trade list and only a very small advance in batteries and accumulators, but telephone and telegraph apparatus is put down for a 41 per cent increase, electric lighting apparatus for 52 per cent and vacuum cleaners and other portable appliances (separated from the main body of electrical apparatus) for 70 per cent.

Trade returns for the past two years have demonstrated the willingness and ability of the electrical industry to contribute more than its proportionate share to export trade. It has not been easy going, for the tremendous essential home needs have had first to be met and there have been many wearisome and irritating delays in securing materials and facilities.

Fittings Manufacturers' Experience

Some of these were referred to at a meeting of the Electric Light Fittings Export Group last week at which prominent Board of Trade officials were present (see page 458). Part of the troubles brought up at the meeting may be peculiar in nature or degree to that section of the industry (which, be it noted, has been set a high target in the new plan) but we believe that many of them are typical of the handicaps encountered by all branches and probably by most other industries. No doubt the officials present learned much and will usefully apply that knowledge to the amelioration of conditions.

One point insisted on by most speakers was that a sound home market was an essential basis for export trade as only thus could overheads be spread to reduce prices to competitive levels. Some speakers, while agreeing that certain home needs were properly entitled to "priority," considered that this preference was being extravagantly exercised in some directions.

It was pointed out that willingness of our manufacturers to sell must be matched by an equal willingness on the part of overseas countries to buy. First, of course, the products must be of the kind needed and be reasonably priced but even then they have to surmount import restrictions and high duties. This is where the Government alone can help by diplomatic discussions and commercial treaties which must not be too long delayed.

Given proper Government backing, we have no doubt that the electrical industry will not only reach but surpass the mark which has been set for it.

New Generating Plant

THE proposed addition of four million kW of generating plant, announced in this issue, will probably be no more than enough to bridge the present gap of two million kW between capacity and demand and to allow for increase in electricity consumption before 1951 or 1952. By that time the Ministry of Fuel and Power, Sir Guy Nott Bower has stated, hopes that the full peak load can be carried. This addition no doubt takes account of old plant no longer fit for service. Under present conditions it is not surprising that the Central Electricity Board is arranging for construction five years ahead (instead of four as hitherto) not only for new stations but also for extensions to those in existence.

B.E.A. Meets

ON Thursday last week the British Electricity Authority met as a body for the first time and so, although the vesting date has not yet been announced, the nationalization scheme may be considered to be launched. A statement issued a few days later (reported on page 436) is of a general character but it is in line with what we asked for in last week's leading article. As to the immediate future, the Authority's first task, which under Section 4 of the Act has to be undertaken before the vesting date, is to consult with the Minister of Fuel and Power who has to settle the fourteen areas, so far only defined in general terms. It is possible under this section to reduce or add to the number of areas with the approval of Parliament. The second matter in which the Minister is to be advised by the Authority is the appointment of the Area Boards. The first four chairmen are known but the names of the other ten have yet to be announced and there will be between 70 and 98 appointed members—none of whom may be a Member of Parliament. All these positions must presumably be filled before the vesting date which will probably be in about six months' time.

Coal Stocks

THE amount of coal stored at electric power stations on September 7th is returned by the Ministry of Fuel and Power at 3·8 million tons, giving about 5½ weeks' reserve. These are winter weeks, in which 700,000 tons is taken as an average consumption, and not average weeks over the whole year which would work out at about 500,000 tons each. Until the end of this month a weekly addition of about 100,000 tons (approximately the increase during the first week of September) will therefore be needed to bring stocks up to the 4·2 million tons required to provide a six weeks' margin by the beginning of October. A shortage of domestic coal may cause more electricity to be used, but the allowance of 700,000 tons per week should cover such contingencies.

Circuit-Breaker Developments

WITH transmission at 264 kV as envisaged for this country within the next few years, rupturing capacities of circuit-breakers will need to be raised above the 2,500 MVA already required with the 132-kV grid. Abroad transmission at 400 kV or so is likely also to be carried out with a.c. in the near future. Circuit-breaker design (in the absence of complete understanding of arc-extinction phenomena) must still owe its progress to experimental work carried out in high-voltage laboratories, and the extensions to the G.E.C. plant reported in this issue are indicative of the preparations being made to meet conditions ahead.

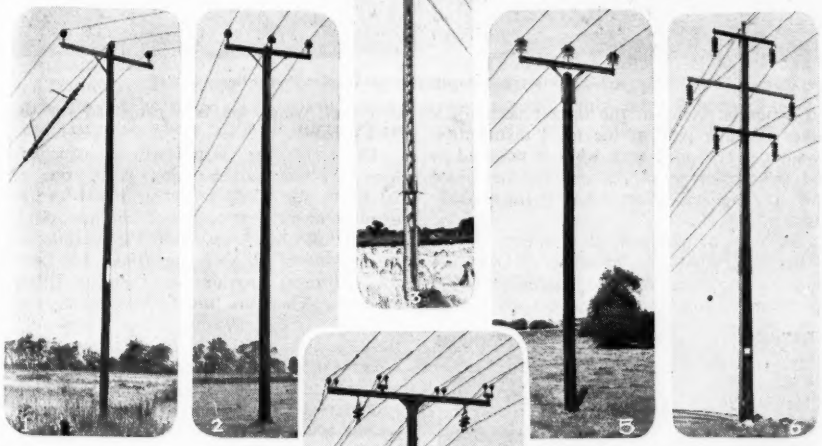
Yorkshire Tour

Resumption of I.E.E. Transmission Section's Summer Visits

IT has this year become practicable to resume the series of annual summer visits of the Transmission Section of the Institution of Electrical Engineers, which was interrupted by the outbreak of war during the Section chairmanship of Mr. S. R. Siviour. Instead of the tour originally planned, a two-day inspection under Mr. Siviour's general guidance took place last week-end of a small portion, mainly in the northern area and for the most part rural in character, of the 2,860 square miles which are served by the Yorkshire Electric Power Co. and its subsidiaries.

Members assembled with their ladies last Friday evening at Harrogate Spa, whence they set out in motor coaches on the Saturday morning south-westerly over Stainburn Moor (743 ft) and entered the area of Electrical Distribution of Yorkshire, Ltd., at Leathley, served by an 11-kV line with pole - mounted transformers stepping down to 230 V single phase.

There was a halt at Pool-in-Wharfedale for a quick impression of the manufacture of " Elephantide " and multiple press papers, which differ materially from bakelized and other varnished insulating materials. The mill of B. S. & W. Whiteley, Ltd., is claimed to be the largest in the world, in one unit, producing electrical pressboard. It is beautifully situated on the River Wharfe, far from industrial pollution, which makers of electrical insulation strive to avoid.



Representative selection of pole lines used by the Yorkshire Electric Power Co. in the northern part of its distribution area

1.—Carlton oil borehole 11-kV, 0·02-sq in. angle pole with pin insulators. 2.—Bickerton 11-kV, 0·025-sq in. " light " line intermediate pole. 3.—Bramham-Becca 11-V, 0·05-sq in. concrete support intermediate pole. 4.—Collingham-Thorp Arch 11-kV, 0·10-sq in. double-circuit intermediate mast. 5.—Cracoe 33-kV, 0·10-sq in. intermediate wood pole with glass insulators on unearthed steelwork. 6.—Ferrybridge-Chevin End 66-kV, 0·15-sq in. double-circuit intermediate steel mast

Steam is used solely for processing; 50,000 gallons of water is evaporated weekly in addition to the million gallons drawn daily from the river. Originally the mill was driven by water power; 200 h.p. is still provided by two Francis turbines while four million kWh purchased annually from

the Y.E.P. Co. through two 800-kVA transformers is consumed by 200 motors aggregating nearly 3,000 h.p., including 22 beating engines, six of the largest being separately driven by motors totalling 620 h.p. A new substation will house two 1,000-kVA transformers for additions to the factory already in progress. One of the three-phase 11-kV lines forming part of the local distribution system is equipped with what is believed to be the prototype of the inclined (anti-bird perch) cross-arm, erected nearly thirty years ago.

Little Ribston low-voltage roadside distributor line

By way of contrast, distribution in the "heavily loaded" market town of Otley, an important centre for the manufacture of printing machinery, is almost wholly underground. Power supplies are taken from 11-kV cables and low-voltage cables are laid in the same trenches.

Aberford-Gregstone Park concrete slab kiosk containing 11-0·04-kV, 50-kVA transformer supplying low-voltage network

Mid-morning arrival at Chevin-End (pronounced "Shevin") permitted a quick examination of one of the main 66/33/11-kV substations, of the outdoor "open" type in general use by the company. The earlier supports are of lattice steel construction, those added later being of reinforced concrete with steel top-gear. The busbars and connections are copper tubes and flexible 0·15 sq in. stranded copper with bronze connectors of the company's own design. The 66-kV busbars are protected by "Metrosil" surge divertors, which are also projected for the 33-kV bars.

Three of the step-down transformers have on-load tap-changing gear; one of 20 MVA for 60/33 kV is arranged for line drop compensation and load compounding; two are of 5 MVA for 30/10·5 kV; while the fourth one of 50 kVA for 10/0·4 kV (with off-load taps) provides local and auxiliary supplies. There are four 66-kV circuits; two are controlled by Allen West isolators only, the other two by 750-MVA English Electric type "OK.GGE" breakers, spring operated and remotely controlled.

Of the six 33-kV circuits, two are terminated on one 500-MVA Metro-Vickers type "HG" breaker, solenoid operated and remotely controlled. The other four have 500-MVA English Electric type "OK.DIB" breakers, spring operated and remotely controlled. Eight 11-kV circuits terminate on a 100-MVA Reyrolle type "C.2" metalclad switchboard (part of the original installation) which is hand operated, but its conversion and segregation is contemplated.

Proceeding over the Chevin (highest point of the route, 840 ft) brought in view a 66-kV double circuit 0·15 sq in. copper line, 31 miles long, of 70 MVA emergency rating which contrasted with a "light" 11-kV, 0·025-sq in. copper line serving a borehole where oil pumping plant is now being installed.

Bramhope village (600 ft) is the company's headquarters, wooden huts and air raid shelters having been provided at the Manor

Farm for a staff of 400 (necessitated by the unsuitability of the Leeds offices) together with full canteen facilities. The whole of the cooking and heating in the buildings is electric, which imposes a maximum demand of 400 kVA on the offices' substation.

Mr. W. R. T. Skinner (general manager, Y.E.P. Co.) presided at luncheon on Saturday and Mr. J. Andrew Lee (construction engineer, C.E.B., London) acknowledged, as I.E.E. Transmission Section chairman, the cordial welcome extended to the guests.

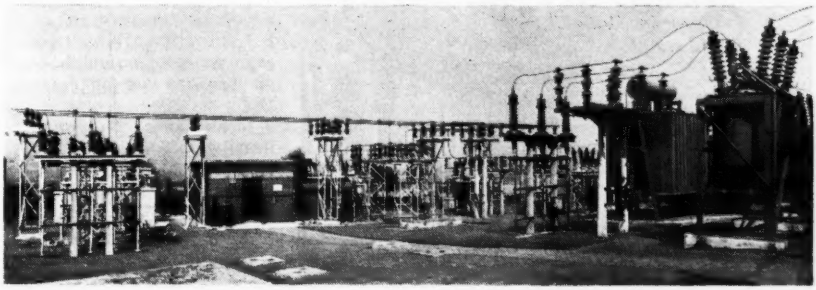
The afternoon drive was westward in Wharfedale, which is a much frequented holiday resort, a generous measure of underground distribution being consequently desirable to preserve village amenities. But the local authorities are very reasonable in their attitude to the erection of overhead lines on the outskirts when well sited to take advantage of natural screening.

Continuing along the valley road into Airedale and the cotton mill towns of Skipton and Gargrave where there are three sets of

The return drive eastward, with tea at Burnsall with its river "beach," one of the prettiest family "playground" villages in Wharfedale, was by way of Bolton Abbey and over Beamsley (nearly 1,000 ft) and Blubberhouses moors to Harrogate.

Substations and pole-mounted equipments total 1,738, of which 29 are at 66 kV. Mains total 4,172 miles, more than half being overhead, with 286 miles at 66 kV and 1·4 miles at 66 kV underground; radial and ring mains at that voltage now form the backbone of the distribution system.

All cables for up to 11 kV are multi-core, armoured and laid direct in the ground; five-core cables are used for low voltages, the fifth core being the supply and switching wire for public lighting. Cables for 33 kV are all of the "H" screened type, none of which has failed inherently during twenty years use; thermocouples are installed along the more important routes for periodically checking temperature. Only short lengths of 66-kV cable are used for connections between



Chevin End outdoor 66/33-kV substation with 11-kV switch chamber

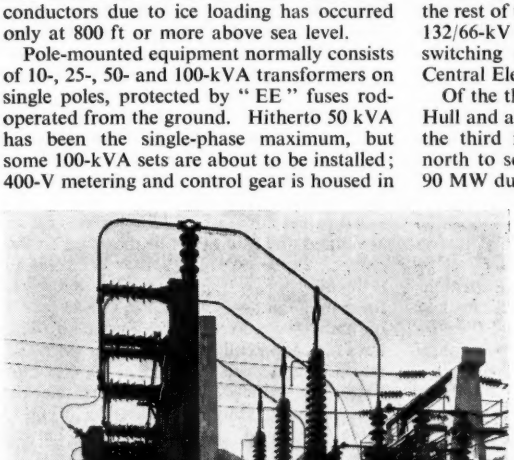
Allen West isolating switches of the horizontal tilting post type (operated from the ground, each set being at the top of a separate mast) for sectionalizing a 33-kV ring main and tee connection to Cracoe. This unearthed line of 33 kV, 0·10 sq in. copper conductors in horizontal formation on both porcelain and glass insulators (to obtain comparative data) is a good example of a well screened line in country where the amenities are of a very high order. It was erected under a Fringe Order, but a Special Order for the district has been applied for. It terminates at a recently constructed 2·5-MVA, 33/11-kV transformer substation providing 300 kVA for the Swinden lime works, to be increased to 600 kVA on completion of present plant extensions and ultimately to 1,000 kVA.

transformers and terminating overhead lines. The earlier ones are all of the single conductor "solid" screened type laid in trefoil position. There has been one failure, caused by external damage.

The majority of the 66- and 33-kV lines are supported on steel masts designed by the company, the earlier and heavier types being riveted and later ones welded. They are fabricated of bulb angles and plates almost completely in the workshops. Strict compliance with the Electricity Commissioners' Regulation limitation of the factor of safety in the direction of the line to one-quarter of that in the transverse direction has resulted in weakness at ground level, necessitating in-line stays at intervals on long routes to limit the extent of possible collapse. New high

voltage lines will consist of wood " H " poles of portal construction for single circuits and steel towers for double circuits. Failure of conductors due to ice loading has occurred only at 800 ft or more above sea level.

Pole-mounted equipment normally consists of 10-, 25-, 50- and 100-kVA transformers on single poles, protected by " EE " fuses rod-operated from the ground. Hitherto 50 kVA has been the single-phase maximum, but some 100-kVA sets are about to be installed; 400-V metering and control gear is housed in a wooden box at the foot of the pole. Kiosk substations are of pre-cast concrete slab construction; various parts are purchased in bulk and the complete building can be erected in a few days. A timber frame to support concrete tiles over the slab roof is normally provided for ornamentation.



Termination of impregnated pressure 66-kV cables in outdoor switching station at Ferrybridge power house

Energy is supplied by the company for public lighting in 158 districts and parishes, approximating to 9,500 street points, 25 sets of traffic islands and 12 sets of traffic control signals. Schemes are being prepared for a further 1,000 points and for " beacon lighting " on stretches of trunk roads, which qualify for Ministry of Transport grants in sparsely populated parishes of low rateable values.

The Sunday morning drive was eastward to York where the ladies remained for a tour of the city with guides provided by Mr. W. A. Crocker (city electrical engineer) while the rest of the party proceeded to Osbaldwick 132/66-kV double-busbar transforming and switching station (Mid-East Area) of the Central Electricity Board.

Of the three 132-kV lines, one goes east to Hull and another south to Ferrybridge while the third is the Norton interconnector for north to south grid load transference, up to 90 MW during the winter months for periods of several hours' duration.

Transformation is effected by three Fuller 15-MVA transformers connected by cables to a 66-kV switching site (the number of on-load tap changes carried out approximates to 1,000 per annum) whence overhead lines of 25/30 MW go to York Corporation and of 15/20 MW to the Malton, Scarborough, Bridlington and Whitby networks. The 132-kV oil circuit breakers are of the B.T.H. 1,500-MVA cross-jet explosion pot type and the 66-kV oil breakers are of Ferguson, Pailin make.

Incidentally, the experimental installation of 132-kV single-core Enfield gas compression cables (*Electrical Review*, October 20th, 1944, and May 25th, 1945) has, since April, 1945, been carrying during the winter months daily loads varying from zero up to 300 A and up to 450 A for short periods. It is satisfactory to record that it has not at any time been necessary to isolate this insert on account of failure of any of the three cables or their ancillary apparatus.

In addition to the local control room at Osbaldwick, the whole of the 132- and 66-kV switchgear and transformer tap-changing gear is controlled remotely from the Foss Islands power station of the York Corporation, indication and metering being registered there also, by means of supervisory equipment made by Standard Telephones & Cables.

Mr. W. M. Lapper (district manager, mid-east and north-east areas, C.E.B.) presided at luncheon on the Sunday in York and Mr. E. T. Norris (past-chairman, Transmission Section) responded on behalf of the visitors.

The road travelled on Sunday afternoon was south-westerly to Tadcaster, which is still mainly d.c., but will be changed over when materials become more plentiful. Meanwhile extensions are a.c. and certain of the heavier power loads have already been converted.

The Central Electricity Board's connection to the Y.E.P. system is by a 66-kV double circuit from the 132-kV substation west of the Ferrybridge power station. One circuit is terminated by an overhead connection; the other by Enfield underground cable, comprising three 150-yard lengths of single-core cable of 0·5 sq in. cross section and rated at 525 A, which is equal to 60 MVA, three-phase. This was the first commercial installation of self-contained gas compression cable in the world and it has operated without breakdown since it was laid in 1940.

Quick Change-over

Another noteworthy cable at Ferrybridge is a replacement of a 66-kV " H " screened " solid " connection that was irretrievably damaged by external causes while the generating set with which it was associated was out of commission for annual overhaul. The machine was put back into service by means of a temporary overhead connection, which was changed over to the new cable in the extremely short time of five days during a period of light load in midsummer 1946.

This cable connects the 11/66-kV generator-transformer set (45,000 kW output) to the 66-kV switching station. Its importance made it desirable to enlarge the margin of safety by increasing the dielectric thickness to 0·29 in., resulting in a maximum stress of 70 kV/cm and a surge withstand voltage of 520 kV (peak) which means that this cable is suitable for normal operation at 88 kV instead of the nominal 66 kV.

The cable is of the B.I. Callender impregnated pressure type (*Electrical Review*, October 11th, 1946) comprising three single conductors of 0·5 sq in. cros ssection with a minimum capacity of 55 MVA, this value allowing for the physical conditions of the route and the proximity effects of other existing and future cables in the vicinity. Actual tests of the thermal resistivity of the soil in which the cable is laid have indicated that a capacity of 57·5 MVA is possible.

A notable example of the variation of the nitrogen gas pressure within the cable (nominally 1,600 lb per sq in.) due to changes of temperature occurred in September, 1946, when flood water saturated the subsoil of the station site and caused a fall of pressure of 18 lb per sq in.; about five days elapsed before it became normal again. Tests applied to the cable on the installation site included measurement of the power factor by an inverted Schering bridge (*Electrical Review*, September 5th, 1947) within a protective Faraday cage. This cable was commissioned in August, 1946, since when the internal gas pressure has been fully maintained.

The Ferrybridge site of 426 acres on the bank of the River Aire, is close to the Yorkshire coalfields. It was the third station to be built by the company; the first of the original two 20-MW Brown Boveri turbo-alternators commenced work in 1927 and two 45-MW English Electric sets were added in 1939. The extension now in progress is for the accommodation of a third 3,000-r.p.m. set of the same make and rating, to operate at 600 lb per sq in. and 825 deg F with four boilers of 180,000 lb per hr each.

All machines generate at 11 kV, which is transformed up to 33 kV in the case of the earlier sets and up to 66 kV in the later ones. All four power stations (Barugh, Thornhill, Ferrybridge, Mexborough) are interconnected and " selected," the last three being base-load stations for the Mid-East England grid area. Plant now in operation totals 281,500 kW and 90,000 kW. is under construction while 45,000 kW has been approved for construction. The maximum demand on the system reached 215,143 kW last year and 869·2 million kWh (excluding 162·3 million for the C.E.B.) was sold to 166,890 consumers.

Rural Areas

In 42 years the company's capital expenditure has amounted to £17,870,209. It has extended beyond Yorkshire into parts of Derbyshire and Nottinghamshire, northern Lincolnshire, 863 sq miles in Cumberland and 237 sq miles in the Settle district. The density of the 3·4 million population served is 1·3 persons per acre in the effective area compared with 7 persons per acre in restricted portions (one-quarter of the whole area) in which two millions live.

Thus the combined area of the associated companies contains a large proportion which is definitely rural and economic development has been practicable only by the extensive use of overhead lines. Particularly is this so in the 781 sq miles of the North Lincolnshire & Howdenshire Co.

Views on the News

Reflections on Current Topics

IN refutation of a gas journal's claim that the correct ratio of gas and electric cookers manufactured should be of the order of nine to one, I recently cited the case of Hull. The preference for electricity there is well supported by the experience at Portsmouth, on a wider basis. Mr. R. H. Coates, in his latest report, tells of the results of a poll taken among 10,000 people on the City's waiting list for houses which showed that 75 per cent preferred electricity for cooking and 77 per cent wanted electric wash boilers. It therefore seems that even the two to one ratio in favour of gas which the writer in the gas journal contested might well be reversed.

* * *

An instance of the effectiveness of promptly applied artificial respiration is recorded in a Lincolnshire newspaper. An employee at a Boston factory received a severe shock from an elevator and, the report states, was "black in the face and foaming at the mouth" when released by his workmates. One of them, fortunately, was able to apply artificial respiration immediately and succeeded in saving the life of his fellow employee who revived after being treated for about twenty minutes.

* * *

I read in the *Accrington Observer* that the National Coal Board has signified to the Accrington Corporation its willingness to enter into an agreement for the reservation of an enlarged pillar of coal beneath the site of the proposed new power station at Huncoat for a sum of £17,000. The report does not make it clear whether the pillar will be the mainstay of the station or a hidden reserve.

* * *

It is interesting to compare the salary scale for chief electrical engineers of supply undertakings in South Africa (reported in last week's *Electrical Review*) with the "Walker" scale adopted by the National Joint Committee of Local Authorities and Chief Electrical Engineers in this country. The "unit" basis is employed in both cases although the Walker scale is in smaller steps. Higher remuneration is specified in South Africa up to 50 million kWh; the difference is most noticeable in the lower ranges. Here the "2 million kWh" engineer gets £567; in South Africa up to 2 million kWh brings in £700. The difference lessens as the output goes up and at 50 million the figure for Great Britain is £1,625 against the South African £1,500. As in this country, there is a reduction in respect of energy purchased in bulk, but no account seems to be taken of sales in bulk to large consumers which also leads to an adjustment here.

* * *

Many of the much-publicized American inventions turn out to be merely new versions of things already well-known in this country. Last week an evening paper printed a note from Chicago claiming as new a delayed-action lighting switch and a device comprising an alarm and arrangements for switching on a radio set and making coffee. So far as I can see the only novelty is that the American model makes coffee whereas the English one makes tea—merely a concession to national taste.

* * *

Last week the members of the Central Electricity Authority gathered for their first meeting in a room at the Ministry of Fuel and Power. This being a historic occasion, press photographers went to put it on pictorial record. One of them brought along some powerful lamps to assist the process and found a power point. I am told that he plugged in and switched on and found no power and nobody seemed to be able to discover the appropriate switch. Such a thing would happen on such an occasion and in such a place of course.

* * *

In this country overhead line poles are attacked by weather, soil conditions and insects and animals sometimes use them as scratching posts. All these troubles are no doubt encountered in Wisconsin too, but there they also have bears which feed on the poles. The *Electrical World* illustrates the effect upon a pole in a 13·8 kV single-phase line, one of seventy-five which have provided ursine sustenance. In some cases they have been so badly chewed that stubbing has been necessary.—**REFLECTOR.**

A.P.L.E. Conference

Current Street Lighting Problems Discussed at Southport

NEARLY a thousand delegates have this week been attending the annual conference of the Association of Public Lighting Engineers held at Southport. With the existing restriction of street lighting to 50 per cent of pre-war consumption conditions cannot be said to offer much scope for the street lighting engineer in his duties and it is therefore all the more encouraging to find evidence of so much constructive work being carried out in the field of illumination in preparation for better days than the present.

Early in the proceedings the president, MR. THOMAS WILKIE, in his presidential address, voiced the views of many when he declared that in his opinion the present restrictions were not justified by known facts and should be withdrawn immediately. Apparently, he said, saving coal was more important than saving human life. No public service was more concerned in road safety than lighting and, quite contrary to existing restrictions, local authorities should be encouraged to raise existing lighting standards. This was more than justified when one realized the relatively small amount of coal involved even in full pre-war lighting. He knew of no measure or restriction which was more unpopular with the general public.

Mr. Thos. Wilkie, President of the A.P.L.E.

Apart from the restrictions, there appeared to be a growing tendency to relegate public lighting to the imputed unimportance it held years ago and to negative the science which had been arduously developed. There was indeed a growing school of thought which argued that street lighting, because of our survival during its suspension during the war and the restrictions subsequently imposed, was not so necessary nowadays. The need for lighting to-day was even greater than before and he trusted that local authorities would insist on putting this service in its proper relationship with other communal services and not treat it as something that could be "axed" on the slightest pretence.

Recalling his previous presidential address seventeen years ago, Mr. Wilkie repeated that there was still need for legislation that would lay upon local authorities the definite responsibility for providing efficient street lighting instead of continuing it as a permissive service. Too often the installation of lighting and more so the standard thereof, was decided on purely financial grounds. Finance was important, but street lighting to-day was so bound up in our normal social life, and in protecting life and property, that financial considerations should be viewed in their proper perspective.

Street lighting should be the concern of a qualified official, especially in the larger administrative areas, and should be divorced from the Gas and Electricity Departments. The nationalization of these industries would make this divorcement inevitable and several local authorities were already considering the position of street lighting after the vesting date. From his personal experience nothing could be lost, but much gained, by developing a separate lighting organization. Mr. Wilkie suggested that the appropriate Ministry should name in every local authority a committee (or official)—most likely the police—in which would be vested full authority and complete dictatorial powers to deal with matters of road safety.

Safety and Order

"Street Lighting in Relation to Road Safety, Traffic Problems and Crime Detection" was the subject of the first paper on Tuesday. Lamenting the present street lighting restrictions, the authors, MR. A. E. MARCHANT (Barking) and MR. ROBERT BELL (Erith) pointed out that with half lighting the electricity consumed was considerably less than 1 per cent of the total generated and to provide full pre-war lighting less than 1 per cent of additional fuel would be needed.

To improve seeing conditions after dark was an obvious way to reduce road accidents, which in 1946 included 5,062 deaths, 35,566 serious injuries and 120,896 slight injuries. Could we afford to be without good street lighting? Every local authority must want good street lighting but many of them had been deterred from providing it because of

the cost. Adequate grants from national funds would remove this difficulty and materially assist in promoting uniform and better lighting.

It was difficult to obtain statistics showing the effect of improved street lighting on the accident rate but the number of night accidents on Victoria Embankment fell after an improved lighting scheme had been installed in 1930 by 31 per cent in the summer and by 81 per cent in the winter.

The lowering of the accident rate, besides saving life and limb, had other important economic repercussions. Apart from the hardships resulting from loss of earnings by injured persons, there was the needless use of police, medical men, insurance staffs and even firemen. Police proceedings, heavy legal fees, and repairs to property were also involved. It was estimated that the total cost to the community of accidents in 1945 was about £100,000,000 and the Departmental Committee on Street Lighting had reported that if all classified roads in the county boroughs and 20 per cent in the counties were lighted, the annual cost would be approximately £3½ million.

Need for Uniformity

Prevention of accidents in Great Britain was especially important since its motor traffic density was probably greater than in any other country. A reasonably even level of visibility was essential to good lighting and until one common standard was generally adopted difficulties would continue to be encountered. Some form of gradation of light from one system to another contiguous to it might with advantage be devised. Lack of uniformity in lighting had been the cause of a large number of accidents. With good lighting traffic circulation was improved and traffic capacity of roads was increased. When visibility was good the whole of the road surface was used, whereas without it vehicles tended to keep nearer the crown of the road. With proper lighting, shopping and important urban centres could be made attractive with consequent benefit to the shopkeeper and the locality.

Crime and properly lighted streets did not go together and good street lighting increased the effective strength of the police force (now undermanned), since it not only enabled a particular policeman to watch a considerable area and to observe from a distance, but tended to discourage malefactors owing to the increased risk of detection.

Speaking of his experiences in street lighting maintenance at Sheffield, MR. J. WOODHOUSE said it was the practice there for each lamp attendant to inspect the round allotted to him every night, a "round" comprising that proportion of the city's lamps which could be inspected on foot or cycle in approximately two hours, and cleaned once a fortnight. Unless there was nightly inspection it was certain that one or more lamps would be unlighted for part or whole of the night. To allow a lamp to remain unlighted was apt to create an impression of general slackness or to show that lighting engineers too were beginning to think as many other people who had come to regard street lighting as a luxury. They must give a lead to dispel this attitude.

Cleaning Methods

At Sheffield there was no inspector for any particular round but each round was checked in turn by all the inspectors. The practice of fixed inspectors created a competitive spirit but the Sheffield method provided a means of checking the diligence and efficiency of individual inspectors, the lazy and negligent man being quickly revealed by a comparison of his reports with those of his colleagues.

Experience had shown that it was impossible to clean prismatic glassware satisfactorily with a washleather and cloth. Soap and water must be used. Despite continuous cleaning twenty-four hours a day the use of a tower wagon for this purpose was found not quick enough and so a floating stock of spare refractors was obtained, the dirty units being brought to the Lighting Department's premises for cleaning and in turn becoming the floating stock. When refractors were being cleaned a random selection of three were given a light absorption test. Summarized in graph form these tests made it possible to plan the cleaning of the lamps so that the route from the city to the industrial area had its glassware more frequently cleaned than the roads from the city to the suburban areas.

Lighting Measurement

The recent decision of the B.S.I. Committee to abandon for the present the completion of the draft specification for street lighting and to concentrate on the production of a Code of Practice based on the recommendations of the Ministry of Transport Report of 1937 adds to a certain extent to the interest in the paper on "Street Lighting

Photometry " by DR. S. ENGLISH, technical director of Holophane, Ltd. Stressing the difficulties of deciding what measurements should be taken to check the satisfactoriness or otherwise of street lighting installations, Dr. English said that the best methods of approaching the solution of the problem were very much a matter of opinion.

Bearing in mind, however, that the ultimate aim was the production of good general visibility, then it was obvious that three major factors must be considered:—The brightness of the road surface and backgrounds, the brightness of typical objects or obstructions on the roadway, and glare. Other things being equal, high and uniform brightness were essential, but other things never were equal and so in certain cases good visibility might be obtained without high and uniform brightness. It was not difficult to ensure quite good brightness contrasts in dry weather, but when certain roads were wet they became quite dark except for excessively bright streaks and objects became quite indistinguishable from the dark areas of the road surface.

To overcome glare and ensure a satisfactory distribution of light along the roadway, the author suggested a modification of the recommendations of the draft B.S. Specification requiring three readings for each lamp, in addition to checking compliance of the polar curves with the most important standard curves for the three recognized types of street lighting, high-angle, controlled cut-off and full cut-off. The paper concluded with a description of the latest types of photometric instruments now available.

Lighting in Side Streets

MR. R. W. STEEL, borough electrical engineer of Cheltenham, in his paper on " Side Street Lighting " said that roads falling within the Group B classification varied very widely and there was room for at least a third group for the local through road where the mounting might well be 18–20 ft with a lumen output of 5,000–3,000 per 100 ft linear. Insufficient attention had been paid to the proper lighting of side streets. Side street lighting was, however, relatively important since by far the greatest proportion of lighting was carried out in Class B roads. It had been estimated that in the larger centres of population there were ten miles of side streets to every one of traffic route. Street lighting should be regarded as a vital and necessary part of the road itself and the costs therefore ought to be included in road development charges. The extra cost falling on housing or road development would be about 10 per cent of the road charges.

The fluorescent lamp had opened up an entirely new field of lighting. There seemed to be little reason why there should not be simple lightweight fittings produced for use in side streets and the problem would surely be simplified when the 4-ft and 3-ft tubes became generally available. These fittings fixed at right angles to the road and having a considerable overhang would have to be mounted at a minimum height of 16 ft 6 in.

Institute of Welding

Autumn Meeting at Olympia

FOUR papers were read at the autumn meeting of the Institute of Welding, which was held in the Engineering and Marine Exhibition at Olympia.

MR. H. E. LARDGE (Joseph Lucas, Ltd.) described how the combustion chambers and exhaust pipes of jet engines of the single-stage compressor-turbine variety for aircraft have been fabricated of sheet metal by welding. His paper included details of the various metals (made by Henry Wiggin, Ltd., and Firth-Vickers Stainless Steels, Ltd.) employed for withstanding high working temperatures. Some idea of the work involved in welding the combustion equipment of the B.37/1 type " Derwent 1 " is conveyed by the fact that each engine needed 3,354 structural spot welds, 4,682 tacking spotwelds, 215 ft of stitch welding, 250 ft of seam welding, 32·5 ft of carbon-arc welding on the discharge nozzle assembly and 23·4 ft of other fusion welding.

MR. E. C. DAVIES explained endeavours being made to improve a.c. welding. For example he outlined one method of reducing the shock hazard by limiting the open circuit voltage of the transformer; also how a better balance of the load on the input mains could be secured by using twin electrodes supplied from a three- to two-phase transformer with the " work " connected to the neutral terminal of the two-phase secondary winding.

Mr. Davies indicated how the welding of aluminium and copper alloys might be improved by increasing the ionization in the arc gap with the aid of modified fluxing materials, or by reducing the cyclic variation of temperature in the molten pool by employing high-frequency a.c. Reference was also made to several innovations introduced with the object of cheapening and simplifying automatic welding.

MR. A. H. BENT dealt with transformer-rectifier outfits for d.c. stud welding and MR. J. K. JOHANNESEN commented on some aspects of the use of welding (by the Premier Electric Welding Co.) for the repair of plant and machinery.

Institution Meetings

Arrangements for First Half of 1947-48 Session

THE London meetings of the Institution of Electrical Engineers open on October 9th when Mr. P. Good, the President, will deliver his inaugural address. The subsequent ordinary meetings so far arranged are as follows:—November 6th: "Electric Traction on the Southern Railway," by Mr. C. M. Cock. November 20th: Report on "The Practical Training of Professional Electrical Engineers," prepared by the Joint Committee on Practical Training in the Electrical Industry, to be presented by Sir Arthur Fleming. December 4th: "Speech Communication under Conditions of Deafness or Loud Noise," by Dr. W. G. Radley. January 15th: "Standardization of Switchgear," by Messrs. D. E. Lambert and J. Christie.

Radio Section.—October 15th: Inaugural address by the chairman, Mr. C. E. Strong. November 5th: "Tests for the Selection of Components for Broadcasting Receivers," by Dr. G. D. Reynolds. November 11th: Discussion on "What Equipment is necessary for the Servicing and Testing of Electronic Devices?", opened by Wing Commander P. Allerston. November 19th: "The Cavity Magnetron," by Dr. H. A. H. Boot and Prof. J. T. Randall; "The High-Power Pulsed Magnetron. Development and Design for Radar Applications," by Messrs. W. E. Wilshaw, L. Rushforth, A. G. Stainsby, R. Latham, A. W. Balls and A. H. King; "The High-Power Pulsed Magnetron: a Review of Early Developments," by Dr. E. C. S. Megaw. December 3rd: "The Design and Operation of High-Power Broadcast Transmitter Units with their Outputs Combined in Parallel," by Messrs. T. C. Macnamara, A. B. Howe and P. A. T. Bevan. December 9th: Informal lecture on "Commercial Disc Recording and Processing," by Mr. B. E. G. Mittell. January 14th: "Reference-Crystal-Controlled V.H.F. Equipments," by Messrs. D. M. Heller and L. C. Stenning. January 20th: Discussion on "To what Extent does Distortion Really Matter in the Transmission of Speech and Music," opened by Mr. P. P. Eckersley.

Installations Section.—October 16th: Inaugural address by the chairman, Mr. R. H. Rawll. November 13th: "Electrical Aspects of Overhead Travelling Cranes," by Mr. G. V. Sadler. December 11th: "Electrical Engineering Problems in the Tropics," by Mr. R. Allan. January 22nd: "The Design of Contactors with regard to their Industrial Application," by Mr. B. Feldbauer.

Measurements Section.—October 17th: Inaugural address by the chairman, Mr. D. C. Gall. November 7th: Discussion on "Telephone Cable Measurements," opened by Mr. S. Hanford. November 21st: "Iron-Loss Measurement by A.C. Bridge and Calorimeter," by Prof. J. Greig and Mr. H. Kayser. December 5th: Discussion on "Economics of Metering," opened by Mr. M. Whitehead. December 12th: "The Design, Testing and Calibration of a Combustible-Gas Detector," by Mr. R. Poole. January 30th: Discussion on "Principles of Instrument Design," opened by Mr. D. C. Gall, Lt.-Col. W. L. Beck, Prof. A. F. C. Pollard and Dr. R. d'E. Atkinson (joint meeting with the London and Home Counties Branch of the Institute of Physics). Particulars of the meeting on January 16th are to be announced later.

Transmission Section.—October 22nd: Inaugural address by the chairman, Prof. W. J. John. November 12th: "Standardization of Power Cables," by Mr. W. H. L. Lythgoe. December 10th: "Some Observations on Oil Deterioration in Transformers and Switchgear," by Mr. H. Hurworth, and "An Electrical Resistance Test for Insulating Oils," by Mr. J. S. Forrest. January 21st: "The Lightning Surge-Strength of Power Transformers," by Mr. E. T. Norris.

Informal Meetings.—October 27th: Discussion on "Standardization in the Electrical Industry," opened by the President, Mr. P. Good. November 24th: Discussion on "Industrial Applications of Inductor Alternators," opened by Dr. J. H. Walker. January 26th: Discussion on "The British Patent System and Procedure," opened by Mr. C. S. Parsons.

Next Week's Events

Tuesday, September 23rd

GLASGOW.—Institution of Engineers and Shipbuilders, 39, Elmbank Crescent. Institute of Metals. Autumn meeting. (September 23rd-26th.)

Friday, September 26th

RUGBY.—Illuminating Engineering Society (Birmingham Centre). Special meeting.

Saturday, September 27th

LONDON.—Junior Instituttion of Engineers. 2.30 p.m. Visit to the Mogden Works (West Middlesex Main Drainage) at Isleworth.

Sunday, September 28th

LONDON.—Institution of Electrical Engineers (London Students' Section). Autumn ramble leaving Leatherhead railway station at 11.30 a.m.

NEWCASTLE-ON-TYNE.—Institution of Electrical Engineers (North-Eastern Students' Section). Annual outing to the Ullswater area, leaving Newcastle Central station at 9 a.m.

I.E.E. Section Chairmen

New Officers for 1947-48

THE new chairman of the Installations Section of the Institution of Electrical Engineers is **Mr. R. H. Rawll,** electrical engineer and manager of the Shoreditch Borough electricity undertaking. Mr. Rawll was educated at the Grocers' Company's School, London, and at Hackney Technical Engineering Institute, and also received technical training with Dick, Kerr & Co. After serving with the Royal Engineers and the R.A.F. during the 1914-18 war he became a pupil under the chief electrical engineer of the London and North Western Railway. He joined the City of Birmingham Electric Supply Department in 1922 as junior engineer, rising to the position of sales and development engineer in 1936. Whilst at Birmingham he was responsible for the extensive conversion from 25 to 50 cycles. Mr. Rawll was appointed " chief " at Shoreditch in 1946. As a major of a Territorial A.A. Battery, he was " embodied " at the outbreak of the last war but returned to his civilian duties in 1940. He has been active in E.D.A. affairs as chairman of the Central England Area and he is a member of the Testing House Committee of the Association. He has also served on the National Executive Council of the E.P.E.A., the No. 5 District Joint Board, the N.W. Midlands J.E.A. and as hon. secretary and chairman of the South Midland Centre of the Institution. He is also a member of the Institution of Mechanical Engineers.

Mr. R. H. Rawll

Mr. D. C. Gall

Mr. D. C. Gall, who is the new chairman of the Measurements Section of the Institution, joined the firm of H. Tinsley & Co., scientific instrument makers, in 1919 as partner to his cousin Mr. H. Tinsley. He has been responsible for technical developments and has invented many instruments. These include a co-ordinate a.c. potentiometer in many forms for different purposes, capacity test sets, precision resistance comparators, geophysical equipment, submarine cable duplexing apparatus, sensitive galvanometers, non-inductive coils and resistance boxes, and numerous other instruments for precise measurement. He has also developed many of the technical processes used in their manufacture. He has taken out over thirty patents connected with instruments. On the retirement of Mr. Tinsley in 1934, Mr. Gall became sole proprietor of the company, and managing director in 1941, when it became a limited company. He has contributed numerous papers to the *Journal of Scientific Instruments* and the *Journal* of the Institution of Electrical Engineers and is the author of two books, " Railway Track Circuits " and " Direct and Alternating Current Potentiometer Measurements." Mr. Gall has been active in the affairs of the Institute of Physics.

Mr. C. E. Strong

The chairman of the Transmission Section of the I.E.E. for the ensuing session is **Mr. W. J. John,** A.R.C.Sc., B.Sc., D.I.C., Professor of Electrical Engineering at Queen Mary College, University of London. Prof. John received his technical education at the Royal College of Science, London, and the City and Guilds Engineering College. In 1915 he joined J. H. Holmes & Co., Newcastle-on-Tyne, as designer of electrical machinery, and in 1918 became chief research engineer with Allen West & Co., Brighton. He went to Queen Mary College as lecturer in electrical engineering in 1919 and was appointed Professor of Electrical Engineering in 1937. Prof. John has been connected with the high-voltage laboratory at Queen Mary College from its inception and is a Governor of the College.

Prof. W. J. John

Mr. C. E. Strong, O.B.E., B.A., B.A.I., who is chairman of the Radio Section of the Institution, is chief radio engineer with Standard Telephones & Cables, Ltd. After receiving his education and training at Trinity College, Dublin, and the Royal Military Academy, Woolwich, he joined the International Western Electric Co., in 1923, and was transferred to the Paris Laboratories in 1929. He was appointed to his present position in 1938.

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PERSONAL and SOCIAL

News of Men and Women of the Industry

THE president elect of the Whitworth Society is **Mr. I. V. Robinson,** Wh.Sc., M.Inst.C.E., M.I.Mech.E., secretary to the Heavy Plant Sections of B.E.A.M.A., who will take office in 1948. Mr. Robinson obtained a Whitworth Exhibition in 1900 followed by a scholarship tenable at the Royal College of Science, South Kensington, where he studied under the late Prof. J. J. Perry. He joined Richardsons, Westgarth & Co. in their Land Department, and after periods in charge of their Glasgow and London offices, went to the company's head office and whilst there represented the company at B.E.A.M.A. meetings. He joined the staff of B.E.A.M.A. in 1919 to supervise the heavy plant interests, and as the Association's representative has attended many conferences of the I.E.C. and the World Power Conference. He was chairman of the technical sessions at the three conferences on International Steam Tables held in London (1929), Berlin (1930) and New York (1934) and in 1933 and 1934 he visited Australia to put forward arguments for the British electrical industry before the Australian Tariff Board for the reduction of import duties following the Ottawa Agreement of 1932.

Mr. I. V. Robinson

Dr. T. H. Hogg, who retired recently from the chairmanship of the Ontario Hydro-Electric Power Commission, has been appointed to the new Manitoba Water Power Commission and has been asked by the Provincial Government to carry out a full inquiry into water-power matters in Manitoba.

Mr. E. C. Smith, head of the Civil, Mechanical and Electrical Engineering Department of the Wigan and District Mining and Technical College, is recommended for appointment as principal of the Burnley Municipal College. Mr. Smith served an apprenticeship with the English Electric Co., and subsequently had industrial experience with the same company. He is an associate member of the three leading institutions.

Mr. T. R. Strawson, A.M.I.E.E., of C. A. Parsons & Co., Ltd., Newcastle-on-Tyne has been appointed to augment the staff of the company's agency company in South Africa. **Mr. W. H. Urquhart** has been appointed to succeed **Mr. A. R. Hemsted** on the Glasgow staff on the latter's retirement.

Mr. C. J. Lever, of Siemens Brothers' Spennymoor (Durham) factory, has taken up his duties as manager of the company's new fluorescent lighting fittings works at Hartlepool. **Mr. G. Monk,** of Woolwich, is deputy manager.

Mr. E. Andrews, A.M.I.E.E., engineer and manager of the Mexborough undertaking, is retiring on October 31st. Mr. Andrews was educated at Royston Grammar School and Sheffield and Leeds Universities, and served an

Members of the British Electricity Authority at their first meeting on September 11th (referred to in a the table) were Sir Johnstone Wright (a member of the Organizing Committee, but not of the B.E.A.), Merseyside and North Wales Board), Sir William Walker, Mr. E. W. Bussey, Sir Henry Self (deputy man), Mr. J. Hacking (deputy Chairman), Dame Caroline Haslett, Lt. Col. E. H. E. Woodward, Alderman West Scotland

apprenticeship with Barnsley Corporation electricity undertaking. After holding several positions there he left in 1933 to take up the Mexborough position.

During his career Mr. Andrews has been chairman of the Sheffield section of the Electrical Power Engineers' Association, the National Executive and he has also been actively connected with E.D.A., the I.M.E.A. and the D.J.I.C. for the Electricity Supply Industry. He will for the time being continue to reside in Mexborough but his inclinations are to take up residence on the Lincolnshire coast at some future date.

Mr. F. G. Bennett, M.I.E.E., A.M.I.Mech.E., until recently chief textile engineer to the Metropolitan Vickers Electrical Co., Ltd., has joined the staff of Wm. Allan Smith & Co., Ltd., Edinburgh, as technical director. Mr. Bennett was educated at Manchester High School for Boys and the College of Technology and, after serving his apprenticeship with the Metropolitan - Vickers Electrical Co., Ltd., joined the Motor Engineering Department in 1927 and was engaged in designing rotating electrical plant. After a period in the industrial section of the General Engineering Department, he was appointed chief textile engineer to the company in 1938. At the outbreak of war he became responsible for a number of comprehensive re-organization schemes in the steel and allied industries in addition to the design and installation of a series of moving target ranges for the Air Ministry. In 1945 he reverted to his textile activities until his association with Wm. Allan Smith & Co., Ltd., in May this year. He will be responsible for the company's technical and industrial work and for the operation of the workshop and maintenance services.

Mr. F. G. Bennett

Mr. F. Overstall, M.I.E.E., deputy city electrical engineer and manager at Peterborough, has been appointed borough electrical engineer and manager to the Burton-upon-Trent Corporation. Mr. Overstall received his technical training at the Manchester College of Technology, and his practical training with the Rawtenstall Corporation Electricity Department. He subsequently held positions as assistant mains engineer with Aylesbury and Birmingham Corporations. In 1939, he was appointed mains superintendent to the Birkenhead Corporation, and in 1941 became deputy borough electrical engineer and manager at Paisley. He took up his present position at Peterborough in 1945.

Mr. F. Overstall

Mr. G. Nuttall, A.C.I.S., chief consumers' accounts clerk in the Dover Electricity Department, has been appointed chief clerk to the Kirkcaldy Electricity Department.

About fifty members of the sales organization of Thorn Electrical Industries, Ltd., spent an enjoyable evening at the Elysée Restaurant, at the conclusion of the annual London sales conference last Friday. Owing to hotel difficulties this year only Southern representatives were present, a similar conference for Northern representatives being held this week at Manchester. Mr. A. S. Shier, the sales director, presided. The toast of the company and Mr. J. Thorn, its chairman and managing director, was proposed by Mr. G. T. Webster, representative for Hampshire, who said how glad he was to see Mr. Thorn and Mr. L. M. Glancy, the Northern

leaderette and on page 436). Those present (reading from left to right round Mr. H. J. Randall (Chairman, London Area Board), Mr. J. Eccles (Chairman, Chairman), Mr. E. Shinwell (Minister of Fuel and Power), Lord Citrine (Chair-W. Lewis (Chairman, Midland Board) and Mr. J. S. Pickles (Chairman, South-Board)

sales director, back again after their illness and he wished them complete recovery. Mr. Thorn briefly responded. Other speakers were Mr. G. A. Shea, senior London representative, Mr. S. T. Holmes, publicity manager, and Mr. E. T. Hunt, assistant sales manager, Northern branch.

Mr. K. H. Quincey, A.M.I.E.E., formerly mains assistant with the Croydon Corporation Electricity Department and now assistant mains engineer with Southend electricity undertaking, has been appointed to the position of constructional engineer at Southend.

Sir Ronald M. Scobie has been appointed a director of British Insulated Callender's Cables, Ltd.

Appointments Vacant.—Among the situations advertised in this issue are the following:—Deputy city electrical engineer for Peterborough; assistant consumers' engineer for St. Helens; commercial assistant for Bury (Lancs); engineers for the Singapore Electricity Department; technical assistant for Islington; resident engineer for the Barton station, Manchester; electrical engineering assistants for the Iraq Government; station engineer for the Gold Coast; instructor in electrical engineering for Nigeria; lift, crane and electrical plant inspectors for the British Engine Boiler and Electrical Insurance Co.; and combustion engineers for the London Passenger Transport Board.

The Northmet Players are presenting an original revue entitled " Current Events " at the Church House, Southgate, on October 16th, 17th and 18th. The material and production are entirely the work of the staff of the Northmet Power Co.

The senior staff of the Watliff Co., Ltd., held a dinner recently at Wimbledon Hill Hotel to celebrate a record output for the year ended June 30th last. **Mr. W. Martin Hulme** (chairman) presided over a gathering of about forty, which included Messrs. S. J. Watson, A. O. Hinchliff and A. F. J. Wright (directors) and Mr. W. E. Arnold (general manager). In a brief speech Mr. Hulme complimented the staff for their excellent work during the past year and paid particular tribute to Mr. Arnold, who also spoke. The dinner was followed by a cabaret.

Obituary

Mr. H. Savage.—Many in the electrical industry will learn with regret that Mr. Henry Savage, M.I.E.E., A.M.Amer.I.E.E., F.I.R.I., formerly works manager of W. T. Henley's Telegraph Works Co., Ltd., died on September 7th, at his home in Folkestone. He joined Henley's North Woolwich Works in June, 1890, as a junior test-room assistant. In 1919 he became joint works manager at those works with the late Robert James Hatton, and a year later he was appointed works manager when Mr. Hatton retired from the managership. Mr. Savage retired on June 30th, 1930. During his retirement he became actively interested in the Royal Empire Society; he had also been a member of the Folkestone Town Council.

Wills.—Mr. G. H. Knight, of Southbourne, Sussex, electrical engineer, who died on May 4th last, left £7,802 gross, with net personalty £6,935.

Mr. A. V. Swallow, works manager of St. Helens Cable & Rubber Co., Ltd., who died on April 10th last, left £3,889 gross, with net personalty £3,710.

Mr. A. M. Alexander, vice-chairman of Creed & Co., Ltd., and former vice-chairman of the Thames Iron Works, left £16,561 gross (net personalty £16,513).

Mr. F. J. Thompson, A.M.I.E.E., Twickenham, left £6,161 gross (net personalty £6,091).

British Electricity Authority

Lord Citrine's Statement

THE newly-constituted British Electricity Authority held its inaugural meeting on September 11th and in a statement issued a few days later Lord Citrine, chairman, said that it would clearly be premature for the Authority to announce any immediate details of its general plans and policy. After referring to the existing plant shortage, Lord Citrine said that although this shortage could not be overtaken for several years owing to the rapid growth of public needs, the Authority put first and foremost the necessity to meet these needs as soon as possible and to give the public a service of ever-increasing efficiency. Immediate arrangements must be made to ensure that, so far as present conditions permitted, the needs of the nation would continue to be met when the day came for the vesting of the numerous electricity undertakings in the Central Authority or the Area Boards.

The B.E.A. would be specially concerned to maintain effective management during the transfer. It would also endeavour, as far as humanly possible, to secure that the employees would not be exposed to breaks in their employment or a worsening of the conditions under which they were working. There would be no abrupt break with the past.

Changes consequent upon reorganization of the industry were bound to come, but in so far as these changes adversely affected contracts of service the individuals concerned would be covered by the reasonable operation of the safeguards provided in the Electricity Act of 1947. The Minister had promised that full consultation would take place with the trade unions before the regulations provided for in the Act were made. Lord Citrine was confident that the number of such cases would be limited and said that the new Authority looked to all employees in the industry to arrange that the change-over took place with the utmost smoothness and efficiency.

Export Expansion

Statement by Sir Stafford Cripps

PLANS for a considerable increase in our export trade were placed before a meeting of industrialists and trade unionists by SIR STAFFORD CRIPPS, President of the Board of Trade, at the Central Hall, Westminster, on September 12th. In a long speech the President reviewed the country's economic situation brought about by world tendencies which two long wars had speeded up. He said that we could not rely further upon the kind of assistance which we had received during and since the war and had to pay our own way. This could be achieved only by a very great expansion in our export trade—an expansion which would have to be made largely at the expense of the home market—in order to secure essential raw materials and food.

At present the gap between our imports and exports was about £600 million a year. Cuts imposed on the home consumer, which were not necessarily final, were calculated to save £228 million—if the present price level prevailed—leaving a difference of £372 million, or rather over £30 million a month to be covered by increased exports and give us an overall balance. This represented an advance of about a third on our current monthly figure. A much greater increase would be needed if we were to improve our standard of living.

The Government had decided to set individual industries actual tasks for which all the necessary materials, labour, etc., must be provided. Man-power would be increased by quicker releases from the Services and the labour employed in non-essential production would be reduced. Substantial cuts in capital construction would release both man-power and materials, particularly much-needed steel.

Responsibility of Private Enterprise

Every manufacturer had to become "export minded" and seek foreign markets energetically. They would not allow goods to be diverted to the home market because they could not be sold abroad; the materials would have to be used in some other form of export. It might be necessary to increase our capacity for the production of profitable lines of export. This would be left to private enterprise but, failing a willing response, the Government might have to undertake the necessary extensions. The industrialists' organizations would have to see that Great Britain's reputation for good workmanship was not sullied by "get-rich-quick" exporters. Price was also an important factor in what were becoming competitive markets and everything must be done to reduce costs.

A guiding committee for this export drive had been formed under the chairmanship of Mr. Harold Wilson, Secretary of Overseas Trade; on this would be represented all the production departments, the Treasury, the Foreign Office, the Commonwealth Relations and Colonial Offices and the Planning Secretariat. More detailed matters would be dealt with by sub-committees. He hoped that speedy progress would be made with the setting up of Development Councils in industries and he stressed the importance of the fullest consultation between managements and workers. The number of export officers would be increased; these and the trade associations would give guidance to new exporters.

High Conversion Value

It had been adopted as a principle that where a choice existed preference would be given to goods which had a high conversion value to get the most out of the raw materials used. Sir Stafford said that with the estimated production of 14 million tons of steel next year and the economies in home consumption there would be enough for the export programme. Other materials must be made available for export but the utmost economy in use was essential and salvage should be tightened up. In conclusion Sir Stafford expressed faith in our future and confidence that the great task could be performed.

Circulated to those at the meeting was a schedule of the actual amount of export business expected from various industries. It showed that total exports in the fourth quarter of 1946 were valued at £88·74 million per month (110 per cent of the 1938 level). By mid-1948 the monthly figure is expected to rise to £114·345 million (143 per cent of 1938) and by the end of 1948 to £131·65 million (164 per cent). So far as the electrical industry is concerned the past figures and expected levels are as follows:—

ELECTRICAL EXPORTS. MONTHLY VALUES (MILLIONS OF £)

Class	Fourth quarter 1946	Forecast mid 1948	Forecast end 1948
Elecl. machinery	1·620	1·915	2·085
Wires and cables	0·900	0·900	0·900
Radio apparatus	0·930	1·000	1·000
Telephone and telegraph apparatus ..	0·460	0·600	0·650
Lighting apparatus	0·330	0·450	0·500
Batteries and accumulators ..	0·240	0·250	0·250
Vacuum cleaners and other portable appliances	0·200	0·330	0·340
Other products ..	0·960	1·000	1·000

SIR CLIVE BAILLIEU, acting president of the F.B.I., who followed Sir Stafford Cripps,

expressed relief that for the first time industries had been given concrete tasks by the Government; these were " tough " but they would be tackled and, he thought, would be accomplished. He asked if industry would be assured of the necessary coal and power and whether it would be possible to send the goods to the right markets. Industry should have the first claim on fuel and power and not remain a " residuary legatee." Did Sir Stafford intend to see to this? He welcomed the projected cut in capital expenditure as a means of releasing raw material and said that the Budget and social programme must be made to conform with the export plans. He thought that Sir Stafford Cripps had not given much assurance that we should be able to sell the larger volume of goods produced. He considered that it was better for each industrial unit to face its own problems rather than have them handled by Development Councils.

Sir Clive Baillieu calculated that the plan meant the export of a quarter of our total production. This was roughly the same as in 1924, but then coal, steel and textiles made a substantial contribution; that would have to be made up from other branches. The F.B.I. was studying selling methods and he thought well of co-operative selling.

SIR PATRICK HANNON, president of the National Union of Manufacturers, and MR. V. TEWSON, general secretary of the T.U.C., also spoke. The latter welcomed the proposed joint consultations between management and workers but expressed doubts regarding the repetition of the "distortion of industry " which occurred during the war.

Lighting Fittings Exports

Ways and Means Discussed

WHAT should be done by the Government and the manufacturers to facilitate and increase export trade was discussed last week at a meeting held at the Waldorf Hotel, London, between representatives of Government Departments and the Electric Light Fittings Export Group. A luncheon preceded the meeting, with Mr. A. E. Iliffe, the chairman of the Group presiding. He and Mr. Felix Rogers, director of the Electric Light Fittings Association and secretary of the Group welcomed the guests—Mr. R. B. Tippetts (assistant secretary, Board of Trade), Mr. D. H. Lyal (Export Promotion Department, B.O.T.), Mr. M. Kielbig (B.O.T.), Mr. J. D. Howie (Ministry of Supply), Col. S. C. Halse (chairman, Lampshades and Standards Manufacturers' Association), Mr. R. D. Best (chairman, National Brassfoundry Association) and Mr. H. Wigston (Electric Discharge Lamp Auxiliaries Council.)

Opening the meeting MR. ILIFFE said that although the Group had appeared inactive much had been done behind the scenes in connection with the allocation of materials. Now they wished to build up the export business and for this purpose impress those in charge of the allocation of materials, timber, packing, shipping and labour that their help was necessary to produce the desired results.

Many of the problems encountered were different for the different sections—decorative and commercial fittings, street-lighting fittings and industrial fittings. The decorative fittings industry was one in which British craftsmanship and art produced goods of great export value. In the other two sections there was competition from local manufacturers although there was no ground for discouragement. It might be necessary to import glassware, in which case the control of imports should be in the hands of those with the necessary experience of lighting fitting production and export. There was, said Mr. Iliffe, a field for the export of street-lighting fittings of the highest quality and the industrial fittings group had great export possibilities. We had the advantages of a developed science of illuminating engineering and the results of many years of research.

The American Continent had not been a large purchaser of British lighting fittings, but there had been and still was a growing demand for our ornamental period fittings. Some loss would be experienced from the import controls imposed by South American countries. The greatest export opportunities lay in the sterling group and in those countries with sterling balances. He did not hope for much business from Canada. The German, Italian and Japanese industries had found large markets and were at present out of action. This country maintained a healthy business with Empire countries and the Eastern Hemisphere, but local manufacture, even at economic rates, had seriously diminished this trade.

To-day the manufacturers generally had orders in hand representing perhaps twice the 1939 export value but they had problems of materials, shipping and labour. He reminded the visitors that lighting fittings had a very high " conversion " value which made them a very desirable export.

In the course of a brief speech, MR. D. H. LYAL said that the Government recognized that export trade was a difficult business requiring knowledge and ability which was generally not necessary in home sales. Every industry should have an Export Group canalizing this knowledge and making the industry's export endeavour effective. Commercial diplomatic officers in the various overseas countries were not hidebound officials; they were active in promoting trade and helping exporters. They received their

directions from the Board of Trade, by arrangement with the Foreign Office, and their services should be fully used. Mentioning complaints of the exportation of inferior goods, Mr. Lyal said that justifiable examples of this were very few. Nevertheless he reminded those present that the goods and representatives sent out were the country's ambassadors and exercised great influence on trade.

In the course of a general discussion which followed, MR. C. HUGHES (Siemens Electric Lamps & Supplies) pointed out that export trade could be based only on a sound home market and it was essential that industries working for export should be properly lighted. He asserted that raw materials were being sent overseas which could be made up into more valuable exports and that "hole and corner" firms were able to secure material which should go to reputable producers.

MR. R. D. BEST referred to his experiences in the United States and expressed the opinion that the best way of doing trade was by joint agencies set up by firms in non-competing but complementary lines. He asked if the Council of Industrial Design fully appreciated the difference in taste of the Americans and ourselves. MR. C. HARVEY (C. Harvey & Co.) said that the present American duties on lighting fittings—between 45 and 60 per cent—made business impossible and the Government should endeavour to secure a reduction.

MR. W. C. HUSTON (B.T.H. Co.) also stressed the importance of the home market as a basis for export trade; only so could manufacturing costs be reduced to a competitive level.

Lower Foreign Standards

MR. F. W. NORRIS (Revo Electric Co.) referred to the difficulties raised by the fact that other countries had not the stringent regulations for fittings used in explosive atmospheres which we had. Again, street-lighting technique here was higher than in some overseas markets which made fittings appear expensive to foreign buyers; the same applied to industrial reflectors. The speaker also pointed to the serious shipping difficulties with which would-be exporters were confronted.

MR. D. H. OGLEY (Wardle Electric Co.) mentioned the suspension of import licences by India. He also asked where export came in in the Prime Minister's list of "priorities." Another difficulty was that glassware makers were exporting the whole of their quota and could not supply fittings manufacturers who were able to give added value to this glassware. Import bans and shipping delays were other serious handicaps.

MR. J. ASSERSOHN (George Forrest & Son) thought that some Government Departments were not very helpful to would-be exporters. This country's strength lay in the craftsmanship acquired through the years; other countries were capable of mass production. But recruits were not forthcoming and the Employment Exchanges seemed to care nothing about it.

MR. NAYLOR (George Forrest & Son) said that the Government had stressed the importance of exports to the public, the workers and the manufacturers but had done little to influence overseas buyers. Its influence should be brought to bear upon foreign customers and Governments to secure modification of import bans.

MR. N. C. HODSON (Veritys) referred to the lack of raw materials and urged a review of the priority system. MR. F. G. NESBITT (Simplex Electric Co.) said that lighting fittings could not be divorced from other lighting material—conduit for instance.

B.O.T. Official Replies

MR. TIPPETTS said that the industry might be asked to double its exports. He agreed as to the importance of the home market. The priorities enumerated by the Prime Minister must come before export but if orders were considered extravagant the attention of the Board of Trade should be called to them. Where raw materials were exported it was because they were needed by overseas suppliers of other essential materials and food. Means would be found for checking leakages of materials to unauthorized manufacturers. He hoped that the Geneva discussions would result in an amelioration of restrictive trade practices. The Export Promotion Department would handle shipping difficulties brought to its attention. The glass industry was being approached with regard to supplies for the production of fittings. Labour would be assured to industries with a good export record. Steel could not be allocated for particular orders as there were serious delays in delivery.

MR. A. S. BURBIDGE (G.E.C. and president of E.L.F.A.) said that 50 per cent of the decorative fittings produced were being exported. They had lost many of their craftsmen during the war but those who remained were doing very well. There were many "invisible" lighting fittings exports—in trains, ships, etc.—for which the manufacturers did not get credit. The manufacturers lighted factories to speed up production to win the war; now they wanted to do the same to win the peace.

MR. KIELBIG assured the members of the Group of the fullest assistance from the Board of Trade. He said that arrangements were being made to ensure supplies of materials for control units in step with lighting fittings and efforts were being made to ensure supplies of glassware.

MR. W. PLEVIN (Specialities (Liverpool), Ltd.) suggested that in the principal ships some indication should be given to passengers (possible buyers) of the suppliers of the ships' fittings, furniture, etc.

Electric Water Heating

A paper on "Water Heating by Electricity" read at an E.D.A. Sales Conference by Mr. R. Lonsdale, deputy borough electrical engineer, Paisley, has been reprinted in booklet form (23 pages; 30 figs.).

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Standardizing F.H.P. Motors

REFERRING to the article by Mr. F. S. Philpott in your issue of September 5th, we can endorse the author's plea for more uniformity. The references to brush-gear especially interested us. Although some hundreds of different holder designs for those of the cartridge type suitable for such small motors are available, we have found that all can be covered by four thread sizes for the moulded caps, four sizes of brass rod and about seven sizes of insulation tube.

Very often motor manufacturers can be induced to make some small modification which allows a standard size of brush-box to be used. Once this is accepted as feasible one can easily accommodate different lengths and diameters for the insulation, as this is not moulded as suggested in Table 2.

Stock material can thus be bought in bulk and holders can be produced for a few pence each, whereas if each maker had to tool up for a few hundred holders of his own design such holders would cost as many shillings. The overwhelming advantage to all concerned of accepting existing standards is illustrated by the adoption by many British makers of holders made to millimetre sizes for the overseas markets on account of their cheapness, in spite of the apparently inherent dislike of metric sizes entertained by the average designer.

Stanmore. A. W. PELERIN,
Synthetic Carbon & Engineering Co., Ltd.

Non-Ohmic Resistances

REFERRING to Mr. C. Turnbull's letter in your issue of September 5th, to say that what the unit meant to Ohm himself is of little importance to-day can hardly be reconciled with the use of the term "non-ohmic." In that case, why divorce the behaviour of a certain type of resistor from Ohm's Law? In effect a new meaning has been given to Ohm's Law for the express purpose of having it in a form to which some conduction does not comply, which seems rather futile. Mr. Turnbull states that if we know the volts and resistance we can deduce the amperes. I prefer to measure the volts and amperes and deduce the resistance.

Next he says, "We now have resistances which vary greatly with temperature," but I suggest we have had these ever since metals were used as conductors. He points out that the resistance of a tungsten-filament lamp will change with variation of applied voltage, and in the next sentence connects this with resistances which "vary enormously" with applied voltage and are therefore called "non-ohmic"; it appears that some confusion with temperature coefficient has arisen. Regarding his suggestion that the term non-ohmic is convenient to use in connection with these last mentioned resistances as they are unstable, I would refer him to the article by Dr. Sillars (mentioned in my first letter) which appeared in the September, 1946, I.E.E. *Journal*. In this the statement is made in Section (2.2) that "silicon-carbide resistors are stable."

Summing up: we have Dr. Sillars using the term non-ohmic on the ground that the resistors in question deviate from Ohm's Law but are stable. Then we have Mr. Carter finding that Ohm's Law is of universal application (with which I agree). Thirdly we have Mr. Turnbull using the term for the invalid reason that these resistors are unstable.

Such confusion results from the use of so illogical a term as "non-ohmic resistors," and I view with trepidation the day when it is discovered that inductance and capacity are also qualities which are functions of many variables and we have "non-henric inductors" and "non-faradic capacitors" thrust upon us.

ROBERT WELLS, A.M.I.E.E.
Walton-on-Thames.

Armature Drop Testing

IN the Danish periodical *Electra*, No. 3, 1947, was described an apparatus for drop testing of d.c. and a.c. machines of any size from 1/20 to 300 h.p. The apparatus consists of a millivoltmeter, with a range of 50-0-50 mV connected across a 6-V, 6-A rectifier, which is tapped on to a variable auto-transformer for 220 V a.c.—all of which is built into a neat portable cabinet.

A suitable reading can always be attained by adjusting the variable auto-transformer. The consumption is small, being a maximum of 70 W for the largest armatures. The tester can, of course, only be used where a.c. is installed.

Copenhagen. AKSEL BAGH.

COMMERCE and INDUSTRY

Electricity Generation in August. Circuit-Breaker Testing.

RETURNS to the Electricity Commissioners show that 2,767 million kWh was generated (2,603 million sent out) by authorized undertakers in Great Britain during August, 1947, as compared with 2,847 million kWh in the corresponding month of 1946, representing a decrease of 2·8 per cent. Up to the end of August 27,289 million kWh was generated (25,743 million sent out) as compared with 26,093 million for the corresponding eight months of 1946, representing an increase of 4·6 per cent.

Generating Plant Production

According to the August "Monthly Digest of Statistics" the production of steam turbo-alternators rated at 10,000 kW or more in May last amounted to 52,500 kW of which 40,000 kW was for export. Figures for earlier months of the year were as follows, the export total being shown in parentheses:—January 60,000 kW (30,000 kW); February 55,000 kW (25,000 kW); March 146,500 kW (74,000 kW); and April 40,000 kW—all for export.

Coal Production and Stocks

During the week ended September 6th, the saleable output of coal was 3,638,300 tons (0·2 million opencast), slightly less than in the two preceding weeks and comparing with 3,805,100 tons in the last week of August last year. The tonnage lost, mainly by the strike at Grimethorpe and other collieries, was 327,300 tons. Consumption by electricity undertakings during the week ended September 7th was 443,600 tons and by gasworks 377,500 tons, practically the same as a year earlier.

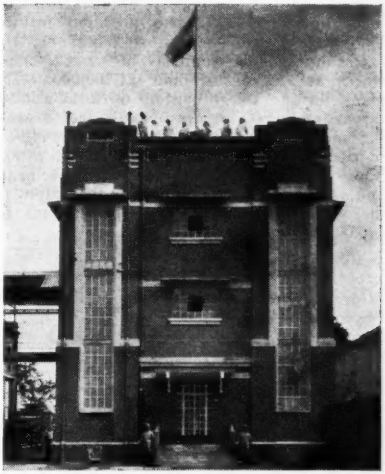
The August "Monthly Digest of Statistics" shows that at the end of July stocks of coal at power stations stood at 3,531,000 tons as compared with only 1,727,000 tons at the end of July last year.

West Bromwich Electrical Exhibition

On August 29th and 30th, a horticultural show and fête were held in Dartmouth Park, West Bromwich. The weather was ideal and about 30,000 people paid for admission. The Corporation Electricity Department held an electrical exhibition in one of the large marquees, at which many modern domestic appliances were on view. Many hundreds of inquiries were dealt with by members of the Department's staff.

Indian Independence Celebrations

The electricity supply industry participated in the Independence Day celebrations in India on August 15th, and apart from the actual ceremonies had to meet considerably increased evening and night loads in consequence of widespread official and non-official illuminations. The new national flags were profusely displayed at every conceivable vantage point, and wherever circumstances warranted there were



Hoisting the new national flag on the switch-house of the Gourepore Electric Supply Co., Ltd.

special flag hoisting ceremonies. In the accompanying picture we show a typical ceremony on the new switch-house of the Gourepore Electric Supply Co., Ltd., Bengal. The flag is being hoisted by the chief engineer, Mr. H. L. Reddyhough, A.M.I.E.E., M.Inst.F., supported by senior assistants and the "Independence Celebration Committee." The ceremony was followed by speeches and a "tamasha" in which members of the staff and their families joined.

Reports on German and Japanese Industry

The following are among the latest published reports on German and Japanese industry, copies of which can be obtained from H.M. Stationery Office:—F.I.A.T. 800, "Nickel Cadmium Storage Batteries in Germany" (2s. 6d.); F.I.A.T. 1027, "The Krawinkel Image-Storing Cathode-Ray Tube" (4s.); F.I.A.T. 1071, "Chlorinated Polyvinyl Chloride" (2s.); F.I.A.T. 1072," "Paste Dispersions of Polyvinyl Chloride" (2s.); F.I.A.T. 1101, "German Methods for the Manufacture of Iron Powder Cores" (1s. 6d.); B.I.O.S. 1399, "The Production of Carbon Black for Carbon Monoxide"

(1s. 6d.); B.I.O.S./JAP/PR. 241, "New High-Permeability Magnetic Material Developed in Japan" (1s.); and B.I.O.S. 394, Vol. III, "Technical Report on the Ruhr Coalfield: Appendix 14. A New Type of Main Road Battery Locomotive" (9d.) (Ministry of Fuel and Power publication which should be ordered by title).

Large Steelworks Plan

Approval has been given by the Iron and Steel Board to a scheme prepared by the Skinningrove Iron and Steel Works for the extension and development of its Cleveland works at a cost of about £1,700,000. The plans include the provision of a new blast furnace and a 300-ton open-hearth steel furnace, the increasing of the capacity of the 18-in. re-rolling mill and the installation of a new power plant. It is stated that the improvements and additions projected will raise the output of the works by approximately 40 per cent, to 300,000 tons a year.

Canadian Export Company

Mr. C. Gordon, jun., president of the English Electric Co. of Canada, Ltd., announces the formation of an export subsidiary, Electric Canada, Ltd. The purpose is to satisfy the growing export demands for Canadian designed and built electrical apparatus, and further to expand the company's sales and manufacturing operations. Mr. G. E. Dunfield has been appointed general sales manager of Electric Canada, Ltd., with headquarters in St. Catharines, Ontario.

Employment in June

Figures relating to employment in the electrical engineering industry in June are published in the August *Ministry of Labour Gazette*. These show that the number of men employed was 105,700, a slight fall as compared with the figure for May of 105,800. The decrease in the number of women shown in the previous month continued (from 51,200 to 51,000). In electrical wiring and contracting the total number of people employed was 53,100, the same as in the previous month, and in the electrical apparatus, cables, etc., group, the number rose from 270,000 to 271,000. In the above table comparisons are given with mid-1946 and mid-1939.

The number of persons who were unemployed (wholly, temporarily and casuals) in the electrical engineering industry in the United Kingdom at July 14th last was 1,922 (including 529 women). This compares with 2,085 (585 women) a month before. In the electrical wiring and contracting industry the unemployed totalled 1,305 (44 women), against 1,238 (64 women), and in the electrical apparatus, cable, lamps, etc., group the unemployed were 2,818 (1,207 women), as compared with 3,015 (1,404 women) at June 16th last.

EMPLOYMENT DURING JUNE (THOUSANDS)

BRANCH	Males (14–65)			Females (14–60)			Total		
	Mid-1939	Mid-1946	June 1947	Mid-1939	Mid-1946	June 1947	Mid-1939	Mid-1946	June 1947
Electrical engineering ..	105·9	99·9	105·7	28·0	53·2	51·0	133·9	153·1	156·7
Electrical wiring and contracting	38·9	45·5	47·5	2·8	5·4	5·6	41·7	50·9	53·1
Electrical apparatus, cables, lamps, etc.	116·4	117·4	138·8	79·5	126·8	132·2	195·9	244·2	271·0

Testing 264-kV Circuit-Breakers

In order that the short-circuit capacity of the high power laboratory at Witton may be correlated with switchgear production at the higher voltages to be expected within the next few years, the General Electric Co., Ltd., has decided to extend the present equipment which has been in operation since 1934 for testing circuit-breakers up to 1,500 MVA at 132 kV. A second low-reactance 3,000-r.p.m. alternator similar in design to the existing machine and having its own super-exciter is to be installed, together with additional reactors for regulating the short-circuit currents. The full short-circuit output from the two machines in parallel will be 4,000 MVA at up to 22 kV.

To the present bank of three single-phase transformers are to be added six transformers and at the higher voltages more than twice the output will be obtainable. The available voltage will also be suitable for testing 264-kV circuit-breakers up to 3,500 MVA. As multi-break designs will be used for circuit-breakers above 264 kV, these can be tested in sections or in units and over 5,000 MVA will be obtainable at the highest voltages.

Czechoslovak Import Duties

Further particulars of the revised Czechoslovak import tariff are given in the *Board of Trade Journal* of September 6th. The list shows increases in the duties on several classes of electrical goods including cables, accumulator plates, carbons, radio and telephone apparatus and small switch- and fuse-gear.

Cardiff Horticultural Show

The Electrical Section of the Cardiff & County Horticultural Show held on August 13th and 14th in the surroundings of Cardiff Castle, was awarded a gold medal. The display was the joint work of the South Wales Power

Co., and the Cardiff Corporation Electricity Department, and proved the most popular attraction of the show. Divided into horticultural, commercial and domestic sections, a great variety of electrical appliances were housed in a marquee. The area in front of the marquee was used to display electric vehicles, electrically-heated greenhouses, and a number of electric pumps in actual operation. An electrically operated fountain, set in a rockery, gave a dignified and attractive touch to the layout. It is estimated that about 10,000 people visited the Electrical Section.

E.T.U. Executive's Appeal

An appeal to all members is being made by the Executive Council of the Electrical Trades Union calling upon them to take their share in increasing production and to bring about the removal of restrictive practices. A letter is to be sent to each member of the Union and area conferences are to be held. The Council at the same meeting passed resolutions calling for a national economic plan, nationalization of the iron and steel industry, reduction of the armed forces, price control and limitation of profits.

A.S.E.E. Activities

The London lecture programme of the Association of Supervising Electrical Engineers opens with the presidential address by Mr. H. Nimmo, on October 14th, at the Lighting Service Bureau, 2, Savoy Hill, London, W.C.2. The presidential address will be preceded by the E.D.A. film, "Can We Be Rich?" During the evening, the president will present the shield and prizes to the winners in the 1946 W. E. Highfield Shield Competition, and the silver cup to the winner of the A.S.E.E. Branch Merit Competition for 1946-47.

The Examining Board of the Association has awarded the silver cup, presented to the Branch obtaining the best all-round record for the year 1946-47, to West London Branch.

Japanese Electrical Exports

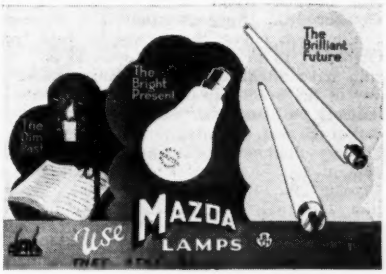
The United States Department of Commerce has published lists of goods and equipment which are now being exported from Japan. Included in these are electric motors, generators (water power and steam power), cables, mercury-arc rectifiers and radio and telephone apparatus. It is stated that supplies of these are limited and will generally be disposed of by arrangements between Governments.

"Mazda" Lamp Publicity

A feature of the lamp publicity of the British Thomson-Houston Co., Ltd., for the coming season is an effective cut-out display piece in which the past, present and future of lighting are symbolized by pictorial representations of a candle, a "Mazda" pearl lamp and 80-W and 40-W fluorescent lamps, on backgrounds of brown, blue and yellow. A red base, with the trade name and silhouettes of home and factory, adds a fourth colour to this attractive showcard. The card is on two planes and is varnished and strutted. It is 28 in. long and 19 in. high.

Literature now available includes Bulletin No. 10 entitled "The Applications of Fluorescent lamps to Street Lighting," booklet L.807/M which gives a description of the "Mazdalux" fluorescent street lighting lanterns, leaflet L.825/M dealing with the lighting requirements of different types of schools, and a bulletin entitled "Circuits for Discharge Lamps." Literature which will be available shortly will cover internally silvered infra-red lamps, tungsten and fluorescent lamp school fittings, mine lighting, and industrial lighting.

Catalogues available include the first comprehensive lamp catalogue (L.812), issued by the company since 1939, a leaflet (L.813) listing



"Mazda" lamp cut-out display piece

all the "Mazda" lamps for domestic lighting purposes and a price list (L.814) of "Mazda" car bulbs. As usual, the company will be advertising extensively in journals, and will take part in exhibitions.

New Hoover Sports Ground

Hoover, Ltd., has acquired the freehold of a seven-acre sports ground for its sports and social club. The ground, which is near the North Wembley Metro Station, was recently formally opened by Mr. C. B. Colston, chairman and managing director, at the company's annual sports day.

Disposal of Second-Hand Equipment

An extension of the activities of the Directorate of Salvage and Recovery of the Board of Trade has been brought to our notice by the Association of Electrical Machinery Traders. This Directorate, which was originally formed to dispose of waste material is now issuing bulletins of privately-owned goods wanted or for disposal, in which a considerable quantity of industrial electrical equipment is included. The Association points out that very largely this equipment is out of date and of little

practical value, and it is of opinion that there already exist in the trade efficient and comprehensive publications and organizations through which such sales can be effected. There are many established businesses which acquire, recondition and distribute such electrical equipment and guarantee that such equipment is serviceable, and it points out that the disposal of equipment without such guarantees can be highly dangerous. The Association maintains that this new service by the Directorate has all the elements of an exchange and mart and will have the effect of subsidizing worthless competition in a highly-skilled and well-organized trade.

Illumination Design Courses

The forty-ninth Illumination Design Course, organized by the E.L.M.A. Lighting Service Bureau, will be held at the Bureau, 2, Savoy Hill, London, W.C.2, from September 30th to October 3rd. An innovation is a three-day continuation course which will be held from October 28th to 30th and is open to all those who have attended the forty-ninth course or any of the other day courses for the electrical industry, in London or the Provinces, since the end of the war.

Other illuminating Design Courses will be held at the Engineers' Club, Manchester, on October 7th, 14th and 21st and at the Corporation Electricity Department, Stoke-on-Trent, on October 13th, 20th and 27th, and November 3rd, 10th and 17th.

Polish Electrical Industry

Poland has at present seventy-three electrical factories, which are producing electric motors, transformers, high-voltage switches, meters, accumulators, valves, telephone apparatus, loudspeakers, batteries, installation material, cables and lamps. A total of 18,500 workers are at present employed in the industry.

German Lamp Production

A shortage of labour and lack of wolfram wire are retarding production at the three major incandescent lamp plants in the British zone of Germany. The three plants, Osram, Merkur and Radium are together producing about 850,000 incandescent lamps monthly. Output of the American zone is placed at 400,000 a month bringing annual production in the two zones up to about 15 million, against 150 million before the war.

Trade Publications

British Aluminium Co., Ltd., Salisbury House, London Wall, E.C.2.—Folder on aluminium and alloy matting, structural and decorative, for electric fire reflectors.

Linolite, Ltd., 158, Bishopsgate, London, E.C.2.—Priced and illustrated list (No. 2) of aluminium reflectors for tubular lamps, skeleton and architectural mounting strip, picture and desk fittings, box signs and adjustable earthing clips.

"Dualit" Works, 27a, Picton Street, Camberwell, London, S.E.5.—Priced leaflet on all-angle local lighting fitting for workshops and offices. Illustrated.

E.A.W. Meeting

A meeting of the South-East England Area (Northern Section) was held at E.A.W. headquarters on September 8th, under the chairmanship of Alderman Mrs. Armitage, president of the Watford Branch. A talk on "My Visit to Canada" was given by the assistant secretary, Miss Vera Norvick, and Miss M. G. Reading, area organizer, spoke about the formation of the latest branches. By courtesy of E.D.A. two new films were shown, "Simple Home Repairs" and "The Electric Iron." The Mayoress of Watford, Mrs. North, was one of the guests of honour.

Northampton Polytechnic

Enrolment is taking place this week for part-time (day and evening) courses in engineering during 1947-48 at Northampton Polytechnic, London, E.C.1, and a prospectus has been issued containing particulars of these courses which include electrical engineering, electrical communication, instrument making, illuminating engineering, electrical installation, radio engineering and cable jointing. The session commences on September 29th.

Trade Announcements

The Birmingham office of **BX Plastics, Ltd.,** is now at Empire House, 159 Gt. Charles Street, Birmingham, 3 (telephone: Birmingham Central 2365).

Macrome, Ltd., who recently removed to modern premises in Wolverhampton, have since taken possession of a further modern factory, adjoining, representing an additional 20,000 sq ft.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

Address of Dridare, Ltd., manufacturers of fan-heater cabinets.

New Uses for Aluminium

Developments in the Electrical Industry

By E. D. Iliff, B.Sc. (Eng.), A.M.I.E.E.*

ALUMINIUM is unique amongst metals for the diversity of applications in the electrical industry. It can be extruded and its alloys are ductile and tough, while castings and forgings can satisfy many of the structural requirements of the electrical engineer. The potentialities have been by no means fully developed as yet and present-day conditions of price and supply provide the impetus for radical changes.

Busbars and Uninsulated Conductors

In July, 1939, electrolytic copper was quoted at £47 per ton and virgin aluminium at £94 per ton. In July, 1947, the prices were: copper £132, and aluminium £80. The importance of this change in relative prices can scarcely be exaggerated. The density of aluminium is only one-third that of copper, so that a conductor of given cross-section would weigh only a third as much. Its conductivity being 60 per cent that of copper, for equal resistance an aluminium conductor will weigh half as much. Estimating on ingot prices, and there is no intrinsic reason why conversion costs should be greater for aluminium, the cost of aluminium conductors should be about one-third that of copper conductors of equal resistance. The conditions for equal temperature rise are even more favourable to aluminium owing to improved heat dissipation, especially in the case of rectangular busbars. There is therefore a strong incentive for manufacturers to replace copper by aluminium, particularly for busbars and uninsulated conductors.

Insulated Wires and Cables

For insulated wires and cables, the extra weight of insulation necessitated by the greater diameter of aluminium conductors will offset to some extent the reduced cost of the metal. Because of this increase in bulk, aluminium is not likely to oust copper for windings of machines, except in special cases, such as heavy magnet coils and field windings.

In rubber or p.v.c. insulated cables, aluminium conductors would seem to be competitive and the overall saving in weight is a slight advantage. As against this, however, is the fact that soldering is more difficult than with copper and mechanical joints are generally to be preferred. Weight reduction is much more important for heavy current flexible cables and satisfactory connections can readily be provided in terminal boxes and couplings. For portable welding equipment and particularly for armoured flexible cables for use in mines, there is a strong case for aluminium, and alloy wire or tape, being adequately tough and resistant to corrosion, is quite suitable for armouring such cables.

Wiring Conduits

It is estimated that aluminium tubing could be sold at a price per foot about equal to that of heavy-gauge galvanized steel conduit and it is therefore directly competitive for installations conforming to the best practice. The change in the price levels as between steel and aluminium is not so startling (steel billets and bars, July, 1939, £7 7s. 6d per ton and 1947, £12 7s. 6d.) but is nevertheless appreciable. A more pressing reason for considering aluminium in this connection is shortage of steel, although facilities for the production of aluminium alloy tubing at the present time are probably inadequate to supply even a very small proportion of the total tubing which is likely to be required for electrical conduit during the next few years. It is worth while, nevertheless, to examine the merits of aluminium as a material for conduit tubes.

Its three main virtues are lightness, ductility and resistance to corrosion, with high thermal and electrical conductivities as subsidiary advantages. The improvement in ease of handling has to be experienced to be believed and the lighter metal is much more readily cut with a hacksaw, a vice being unnecessary to hold the smaller sizes of tube. High thermal conductivity, ductility and resistance to corrosion are the chief reasons for using copper conduit and aluminium can claim the same advantage over steel for use in damp or chemical-laden situations. It is superior to copper in its resistance to attack by coal-gas. High electrical conductivity ensures good continuity for earthing. It has been suggested that since an oxide film of high resistivity forms spontaneously on aluminium the

* Northern Aluminium Co., Ltd.

continuity between sections of tubing would not be good. The oxide film, however, is not more than about 0·0002 mm thick and is easily damaged or removed by abrasion. The action of locking one section of tubing to the next effectively excludes air from an adequate contact area over which the film is prevented from re-forming.

An interesting possibility exists in an alternative method of installation of aluminium conduit. The cheaper alloys of aluminium, which are also those most likely to be satisfactory for conduit pipes, are comparatively soft and would have to be hard drawn to enable satisfactory threads to be cut. Tube drawing is an expensive process and there is therefore an added inducement for eliminating screwed joints. At least one design of coupling exists in which the two halves lock themselves on to the tubes to be connected and can be screwed together or unscrewed without twisting the tubes.

A conduit system employing "as extruded" tubing with special couplings of this type has therefore several advantages. The tubing is less expensive. Being softer, it can be easily set to required shapes, thus dispensing with separate bend and elbow fittings. It can be cut to length on the job and, as the special couplings just slip over the ends of the tubes, the work of cutting threads is eliminated. As the couplings can be broken without twisting the tubes, draw-in boxes are generally unnecessary and maintenance as well as installation is greatly facilitated. The special couplings required are likely to be relatively costly, but the overall savings should nevertheless be substantial. Within the next few years these proposals will be given thorough tests. Meanwhile the position with regard to the supply of aluminium alloy tubes may have changed.

Cable Sheathing

Since July, 1939, the price of lead has increased from £14 10s to £90 per ton in July, 1947. As lead weighs over four times as much as aluminium, the relative price on a volume basis is about 4¾ times that of aluminium. Like lead, aluminium can be extruded, though at higher temperatures. Its resistance to corrosion is comparable with that of lead and it should be in all respects a satisfactory material for sheathing cables, including both domestic wiring and paper insulated cables for power systems. The problem in this case is metallurgical and it is not to be expected that the technique of producing aluminium-sheathed cables will be mastered immediately, but there appears to be a definite prospect of aluminium taking the place of lead for this purpose.

A more immediate possibility is the use of aluminium for the sheathing of mineral-insulated cables, in which copper would presumably be retained for the conductors. Mechanical joints would have to be used for the sheathing instead of soldered joints. Electrolytic action between the sheath and the conductor need not be feared, so long as moisture is positively excluded from the cables and, for this reason, some extra care might be necessary in making the joints.

Mining Equipment

Although there are many other uses for aluminium, the case for its adoption often depends on the existence of special circumstances. For instance, lightness is generally desirable in electric motors, but is sufficiently important to pursue as a positive objective only when mobility or portability are considerations. Mining equipment is a case in point and many items could be considerably lightened, apart from flexible cables. Alloys are eminently suitable for plug and socket castings, while alloy sheet, plate, sections, tubes, wire, castings and forgings would effectively reduce the weights of room switches, gate-end boxes, distribution switchgear, control panels, motors, transformers and transportable substations.

In the design of flameproof motors, heat dissipation is a major problem and the fact that most aluminium casting alloys have three times the thermal conductivity of cast iron should help considerably to minimize the weight and bulk of mine motors. There is sure to be some resistance to changes which would entail scrapping existing patterns, drawing up new designs and tackling afresh the task of securing Buxton certificates. Let there be no misunderstanding of this aspect however: aluminium alloys could be used to reduce very considerably the weight of electrical mining equipment at no great increase in cost. It is for mining engineers to decide whether the advantages to be gained in ease of handling are worth the effort necessary to effect conversion.

Extension of well-established uses for overhead conductors, lighting equipment and domestic appliances is practically certain, and the time is not far distant when aluminium will be recognized as one of the basic materials of the industry.

ELECTRICITY SUPPLY

Rye House Power Station. Swindon Housing Policy.

Bradford.—DISTRIBUTION EXTENSIONS.—The Corporation Electricity Committee is seeking sanction to spend £20,000 on extensions to the distribution system.

Bristol.—LOAN APPLICATION.—To cover expenditure during the ensuing year the Electricity Committee is applying to the Electricity Commissioners for sanction to borrow £195,000. A considerable part of this is required in connection with supplies to new housing estates.

Harwich.—DISTRIBUTION OF PROFIT.—Of the £1,565 profit on the past year's working of the Electricity Department £600 is to be contributed in aid of the rates. The rest will be used to reduce the war surcharge on consumers' accounts from 10 to 7½ per cent.

Ilford.—DEDUCTION FOR REDUCED VOLTAGE.—In the accounts sent out to consumers taking d.c. supplies 5 per cent of the kWh registered during the first quarter of 1947 has been deducted to allow for the effect of the reduction of voltage in that period.

Marple.—MEETING INCREASED DEMAND.—As transformer capacity is less than the maximum demand the engineer has prepared a scheme costing £11,542 for the improvement of supplies.

Middlesbrough.—LOANS.—The Corporation has applied to the Electricity Commissioners for sanction to borrow £10,000 for electricity services, £5,000 for new mains, and £2,000 for the purchase of electricity meters.

Northmet Area.—RYE HOUSE STATION.—The Northmet Power Act, 1946, empowers the Northmet Power Company to take on lease and operate a generating station to be erected by the North Metropolitan Power Station Co., Ltd., at Rye House, Hoddesdon, Herts. A number of contracts for plant have been placed and some of the civil engineering work has commenced. The site of about 90 acres is bounded on the north-west by the L.N.E.R. line to Cambridge, on the east by the River Lee Navigation and on the south-west partly by the Essex Road. It is adjacent to the proposed North Orbital Road. The initial section of the station will include two 32-MW (m.c.r.) Richardsons Westgarth turbo-alternators, two Babcock & Wilcox 350,000 lb per hr (m.c.r.) boilers and one 1,900,000 gal per hr cooling tower. Steam conditions at the turbine stop valves will be 600 lb per sq in. and 850 deg F. The embankment for the railway sidings has already been formed, for which purpose some 100,000 tons of material were excavated from a ballast pit on the site.

Swindon.—HOUSE INSTALLATIONS.—The Corporation is to arrange for electrical and gas apparatus for cooking and washing to be installed in the ratio of two to one in the 120 "Airey" and 39 traditional houses to be erected on the Moredon estate, where the Electricity Committee has approved the provision of mains, substations and equipment costing £10,700.

Overseas

Australia. — PLANT EXTENSIONS. — A new 25,000-kW turbo set being installed at the Balmain (Sydney) power house of the Electric Light and Power Supply Corporation will begin production early next year.

The Victorian State Electricity Commission intends to construct a model township of 200 houses within the next three years to house families of employees engaged on the Kiewa hydro-electric project.

HIGHER CHARGES IN SYDNEY.—The Sydney County Council has decided to increase its charges for electricity as follows: Domestic rates, 10 per cent; commercial (offices, etc.) 8 per cent; industrial 8½ per cent; bulk supply 6 per cent. The increases are expected to yield an additional £403,500 a year.

PURCHASE OF UNDERTAKING.—The Electricity Trust of South Australia, which recently took over the assets of the Adelaide Electric Supply Co., Ltd., has offered to purchase as a going concern the Mid-North Electricity Co., Ltd., of Clare at a price said to be in the vicinity of £65,000.

TRANSPORT

Great Western Railway. — ELECTRICALLY LIGHTED LOCOMOTIVE.—The first G.W.R. locomotive to be equipped with electric head and tail lamps instead of oil lamps has just been brought into service experimentally. The electric lighting equipment fitted to the engine is of an entirely new design and, in addition to lighting the engine lamps, also supplies the lighting for the cab. Plugs are fitted under the footplate for the attachment of lamps for inspection purposes. The lamps are controlled by the driver in the cab from a switchboard incorporating lights indicating which lamps are switched on.

Wolverhampton.—RECORD TRAFFIC.—Passenger-journeys during 1946-47 numbered 97·6 million (76·4 million in trolley-buses), the highest ever recorded. The accounts of the undertaking, of which Mr. C. Owen Silvers is general manager, show a gross profit on trolley vehicles of £87,387 and on motor vehicles £39,217, making £126,604 altogether. After meeting loan charges the balance was £49,792, of which £10,000 has been contributed to the rates. Electricity consumption for traction and vehicle lighting amounted to 12 million kWh (2·253 kWh per vehicle-mile). The average fare charged per mile on the trolley-buses was 0·936d. and on the motor-buses 1·029d.

Municipal Reports

Unnotified Heating Load.

Aberdeen.—Reference is made by the city electrical engineer (Mr. A. Gardner) in his report to a recent sampling survey carried out in conjunction with E.R.A. This showed that domestic consumers in Aberdeen have some 47,250 electric fires with a total loading of 71,400 kW. The discrepancy between the known and the unnotified heating load is indicated by the fact that the total recorded connections of heaters for both domestic and commercial purpose amount to only 50,695 kW. Commenting on last February's ban on consumption during specified hours, the engineer says load readings showed that the response at the best was only about 50 per cent of what it should have been, and it soon become clear that fewer and fewer consumers were paying any attention to the ban.

During the past year 1,800 additional consumers were connected, making 48,218 altogether. Sales rose by 12·3 per cent to 113·6 million kWh. Under the domestic tariff supplies increased by 21·6 per cent to 44·7 million kWh. Income, at £554,066, was up by £75,713, and working expenses advanced by £70,100 to £440,154, the net result of the year's working being a profit of £9,325 against a deficit of £2,134 in 1945-46 (increased charges came into operation in December, 1945).

Canterbury.—From 6,776 in 1940 the number of consumers decreased during the war to 5,905 but at the end of March last had risen again to 6,802. The report of the city electrical engineer (Mr. S. J. C. Ellis) records the completion of electricity supplies to five Corporation housing estates containing altogether 307 houses; one estate of 100 prefabricated dwellings is "all-electric." Sales of electricity in the Canterbury area (excluding bulk supply to Herne Bay) last year totalled 14 million kWh compared with 12 million in 1945-46. Income amounted to £103,096 (£83,273) and there was a deficiency on the year of £4,868 (£3,723). New tariffs were put into operation on January 1st, 1947, providing for an increase in revenue and a simplification of the tariff structure.

Hackney.—Since 1939-40 the cost of electricity purchased has risen from 0·583d. to 0·847d. per kWh sold (45·3 per cent increase) while the average selling price less discount has advanced by only 8·5 per cent—from 1·307d. to 1·418d. Nevertheless, last year there was a net surplus of £41,033, this satisfactory result being due largely to the considerable increase in kWh sold and the decreasing burden of distribution loan charges. The latter averaged 0·481d. in 1940-41 but only 0·192d. last year. It is pointed out, however, that the benefit is transitory as heavy capital expenditure commitments are accumulating.

Flood Damage at York.

Excluding bulk supplies the undertaking (borough electrical engineer, Mr. E. A. Mills) sold 100·3 million kWh, an increase of 19·7 per cent compared with 1945-46. Of the additional 16·5 million kWh sold, 13·3 million was in supplies under the domestic tariff. The undertaking itself generated 224·7 million kWh (against 168·7 million in 1945-46). Revenue from the sale of electricity in the Hackney area amounted to £613,704 (against £531,659), total income including bulk supply being £704,562 (£605,654) with working expenses of £585,853 (£492,524). The net surplus of £41,033 compares with £15,281 for 1945-46; no income tax is payable as the surpluses are covered by losses brought forward from the war years.

Nottingham.—During 1946-47 the Electricity Department (city electrical engineer and general manager, Mr. M. Wadeson) sold 257·4 million kWh—37 million (16·8 per cent) more than in the previous year. Domestic consumers accounted for more than 20 million of the additional kWh sold (representing an increase of 41·2 per cent in this category) and supplies under the "power" rate, apart from those by contract, etc., rose by 12 million kWh (21 per cent). At the end of March last there were 121,809 consumers connected, an addition of 2,622 during the year when, including transfers, 10,912 supply applications were received. Meters on circuit numbered 182,028, of which 124,453 were of the prepayment type. At the North Wilford station 382·5 million kWh was generated, an increase of 15·1 per cent on 1945-46.

The year's income amounted to £1,291,078, having risen by £149,742, and working expenditure at £1,055,588 was up by £140,235. Loan charges absorbed £176,445 (£14,377 decrease) and after meeting income tax and other charges there was a net profit of £50,547 compared with £35,069 in the preceding year. Of this amount £48,000 (£35,000) has been appropriated as rate aid. The average price obtained per kWh sold during the year was 1·18d.; this compares with 1·22d. in 1945-46 and 1·31d. in 1937-38, although during the intervening period the lowest point reached was 1·11d.

Nuneaton.—The annual accounts of the Electricity Department (electrical engineer, Mr. J. Lightbown) show an increase in income of £17,410 to a total of £162,507, working expenses rising by £13,543 to £134,102. The net result was a profit of £4,122, of which £2,628 has been contributed to the rates. During the year the undertaking sold 31·5 million kWh, an increase of 3·4 million over 1945-46.

York.—Besides the problems common to other undertakings the Electricity Department

had to contend with severe floods in the past year. At the Foss Islands station water entering through cable conduits, etc., necessitated the continuous operation of some twelve pumps. Five substations in the city were flooded to a depth of 5 ft and were out of commission for five or six days and the supply to 2,000 premises was interrupted. In the previous August a sudden and unprecedented flood inundated the h.v. windings of plant dismantled for repair at the Linton Lock hydro-electric station. One of the sets was eventually dried out, but the larger had to be rewound, so that the year's output dropped from 2,000,000 to 588,000 kWh.

During the year the Department (city electrical engineer, Mr. W. A. Crocker) sold 122·4 million kWh compared with 111·6 million in 1945-46. Income at £511,088 was up by £6,253 but total expenditure rose by £89,475 to £577,077, leaving a deficit of £65,989 which, the engineer says, is well covered by the reserve fund.

Generating Plant Extensions

Central Board's New Programmes

TWO new programmes of the Central Electricity Board provide for the installation of 2,306,500 kW of generating plant to be in commission by the winter of 1951 and 1,617,000 kW by the winter of 1952 at a total capital expenditure of nearly £190 million. These programmes cover over 60 projects, including seven new stations in each of the two years, and the Electricity Commissioners have approved arrangements between the Board and authorized undertakings for a substantial proportion of the plant.

Taken in conjunction with the 6 million kW (including seventeen new stations) to be commissioned by the winter of 1950, the aggregate capacity in hand is close on 10 million kW (including thirty-one new stations) and the estimated capital cost of the new plant approaches £450 million.

The accompanying list of generating plant with an aggregate capacity of over 2,000,000 kW relates to arrangements made since January 1st of this year.

Scheme Area	Station	Owners	Turbo-alternators, number and capacity (kW)	Boilers, number and capacity (lb per hr)
Scotland	Portobello	Edinburgh Corporation	1 — 60,000	1 — 540,000
N.W. England & N. Wales	Warrington	Warrington Corporation	1 — 20,000	1 — 200,000
	Carrington	Manchester ,,	1 — 60,000	2 — 360,000
	Westwood	Wigan ,,	1 — 30,000	1 — 300,000
	Bolton	Bolton ,,	1 — 30,000	2 — 180,000
			1 — 1,250*	
	Whitebirk	Blackburn ,,	1 — 40,000	3 — 150,000
	Chadderton	Oldham ,,	1 — 60,000	2 — 360,000
	Clarence Dock	Liverpool ,,	1 — 50,000	2 — 350,000
			1 — 1,500*	
Mid-East England	Sculcoates	Hull Corporation	1 — 30,000	2 — 190,000
	Skelton	Leeds ,,	1 — 60,000	1 — 550,000
	Keadby†	C.E.B.	3 — 60,000	3 — 550,000
	Lincoln	Lincoln Corporation	2 — 20,000	4 — 120,000
	Thornhill	Yorkshire E.P. Co.	1 — 45,000	4 — 180,000
Central England	Hardingstone	Northampton Co.	1 — 30,000	2 — 190,000
	Stourport	S.W.S. Co.	1 — 60,000	1 — 525,000
	Staythorpe	Derby & Notts Co.	1 — 60,000	3 — 240,000
	Walsall	W. Midlands J.E.A.	2 — 30,000	3 — 150,000
	Meaford	N.W. Midlands J.E.A.	2 — 60,000	4 — 360,000
S.E. & E. England	Fulham	Fulham Borough Council	1 — 60,000	—
	Littlebrook	Kent E.P. Co.	2 — 60,000	4 — 360,000
	Rye House	Northmet Co.	2 — 30,000	2 — 330,000
			2 — 2,000*	
	Hackney	Hackney Borough Council	2 — 30,000	4 — 190,000
	Battersea	Battersea ,,	1 — 30,000	2 — 190,000
	Bankside‡	City of London Co.	2 — 60,000	4 — 360,000
S.W. England & S. Wales	Plymouth	Plymouth Corporation	1 — 30,000	—
			1 — 1,250*	
	Portsmouth	Portsmouth ,,	1 — 30,000	2 — 190,000
	Poole	Bournemouth & Poole Co.	1 — 50,000	2 — 300,000
	Usk Mouth†	Newport Corporation	6 — 60,000	12 — 360,000
	Carmarthen Bay	Llanelly Co.	2 — 60,000	4 — 360,000

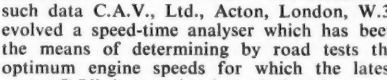
* Auxiliary sets.
† New stations.
‡ Cancelling a previous direction for 2 — 50,000 kW sets and 4 — 300,000 lb per hr boilers.

Vehicle Dynamos

Speed-time Analyser Helps Design

DESIGNERS of electrical equipment used on road vehicles need to evaluate the operating speed conditions throughout the service life of the machine. For forecasting such data C.A.V., Ltd., Acton, London, W.3, evolved a speed-time analyser which has been the means of determining by road tests the optimum engine speeds for which the latest type "G.7" dynamo has been designed.

The analyser is operated electrically and can be readily installed in the test vehicle, without any modification to the driving engine itself. It records the time spent at various speeds over a given period, which may be an



Rotational speed-time analyser with nine electro-magnetic counters

hour, day, week, or any other length, the totals being obtainable merely by reading counters.

A centrifugal speed-sensitive element responding to the rotation of the engine has a movable output arm, which is deflected in proportion to the speed, so making and breaking a series of electric contacts (each energized over a particular range of speed) connected to a corresponding number of electro-magnetic counters, in conjunction with an interrupter arranged to provide one-second impulses.

At the end of the test period the total time spent in each of the selected speed ranges (of which there are nine in the analyser illustrated) may be read off and the figures used to draw graphs of engine speed-time characteristics. For dynamo design it is usual to plot the curves to show the percentage of the total running time above a given speed against engine r.p.m. The dynamo performance curve is then plotted from its known speeds and maximum output, usually on a 100-hr basis and showing the time spent above each speed against output in amperes. The area beneath the resulting curve represents the Ah output of the generator for full load conditions over the chosen period.

With the speed-time analyser indication of the actual operating circumstances it has been possible to make the "G7" type dynamo considerably smaller and lighter than a low speed machine for equivalent duty. It is only 7 in. in diameter and 16¼ in. long overall. Its weight is approximately 76 lb and the cutting-in speed is 1,150 r.p.m. at 24 V with a maximum load speed of 1,450 r.p.m. at 55 A. It should be driven at approximately twice engine speed when used with the normal compression ignition engine for the best results.

By virtue of its high speed it has been possible to design this machine with a single field system without interpoles and, at the same time, obtain a high output. The single field system permits the use of a single regulator. The yoke is of the extended type, with disc type end-shields carrying the bearings and connector socket only. The brush gear is mounted directly into the inside of the yoke, permitting assembly without breaking any electrical connections. A ventilation fan is mounted at the driving end.

Connections to the dynamo are simplified by the use of a multi-pin plug and socket on the commutator end-shield, which is of advantage where space is very limited. Silver plated pins and sockets, to the outer ends of which the wires are soldered, resist surface corrosion and consequently minimize resistance in the circuit. The pins and sockets are asymmetrical to prevent wrong connection.

The armature has also been simplified; laminations and commutator are pressed on to the shaft, which is of one diameter throughout.

The diameter is small, so that the commutator peripheral speeds are normal; current density is no higher, so brush wear is not increased.

New high-speed vehicle dynamo without cover band (left) for brush gear and fan-end cover removed

A limited number of the analysers will become available in due course for research purposes.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Associated Electrical Industries, Ltd., is again paying an interim dividend of 5 per cent, less tax, on the ordinary stock.

Lancashire Dynamo & Crypto, Ltd., is paying an unchanged interim dividend of 5 per cent.

Radiovisor Parent, Ltd., reports a profit for the year to March 31st last of £1,572, as compared with £3,200 for the preceding year, reducing the adverse balance brought in to £23,704.

Peter Brotherhood, Ltd., report a net profit for the year ended March 31st last of £28,950 (against £28,905 for 1945-46) after providing £37,900 (£41,500) for taxation. The ordinary dividend for the year is maintained at 20 per cent.

Bennis Combustion, Ltd., has raised its ordinary dividend from 10 to 12½ per cent. The past year's net profit advanced from £12,108 to £16,446. The allocations include £8,000 (against £4,000) to general reserve.

The Rheostatic Co., Ltd., is paying an interim dividend of 6 per cent; this compares with 4 per cent last year and is on increased capital.

The Lancashire United Transport & Power Co., Ltd., has declared an interim dividend of 4 per cent, the same as last year.

The Automatic Telephone & Electric Co., Ltd., has declared an interim dividend of 3 per cent (unchanged).

The British Thermostat Co., Ltd., is maintaining its interim dividend at 7½ per cent.

Engineering Components, Ltd., has announced an interim dividend of 10 per cent (same).

Newman Industries, Ltd., is again paying an interim dividend of 7½ per cent.

New Companies

Arthur Brand, Ltd.—Registered September 1st. Capital, £10,000. To acquire the business of a dealer in electrical and radio appliances and refrigerators carried on by A. Brand at 33, Nutley Plain, Plymouth. A. Brand is the first director. Regd. office: 33, Nutley Plain, Plymouth.

J.F.J. Products, Ltd.—Registered August 28th. Capital, £1,000. Manufacturers of, and dealers in, domestic electrical and other appliances. Subscribers: S. Jesman and R. Fryzicki. Solicitors: James Brodie & Co., W.C.2. Regd. office: 11, Greek Street, W.1.

Little Atom Electrical Products, Ltd.—Registered September 8th. Capital, £500. Electrical, radio and general manufacturers, engineers, workers, dealers in electrical and other appliances, etc. Permanent joint managing directors: D. Hume and B. St. G. Bower. Regd. office: 6, Market St. Hay, Breconshire.

Thomas Wilch & High, Ltd.—Registered September 8th. Capital, £1,000. Manufacturers, repairers and dealers in dynamos, motors, armatures and electrical plant generally, etc. Permanent directors: P. Thomas, H. S. W. Wilch and S. J. High. Secretary: J. S, High. Regd. office: High Field Works, Swardeston, Norfolk.

Cal Morris, Ltd.—Registered August 30th. Capital, £1,000. To acquire the business carried on by C. Morris at Tower Street, Birmingham, electrical engineers and contractors, wireless engineers, etc. Directors: C. Morris and Ellen F. Morris. Secretary: J. Yeomans. Regd. office: 57, Tower Street, Birmingham, 19.

R.T.A. Equipment, Ltd.—Registered September 4th. Capital, £400. Repairers and manufacturers of, and dealers in, dynamos, motors, armatures, etc. Directors: A. Sargent, Daisy Sargent, E. H. Sansom and N. H. J. Sansom. Regd. office: 5, Streatham Vale, S.W.16.

Ships Aground, Ltd.—Registered August 30th. Capital, £1,000. Electrical and mechanical engineers, etc. Directors: H. J. Seeds, J. F. P. Seeds and C. M. Jones. Regd. office: Plas Gorad, Valley, Anglesey.

Budd Radio & Electrical Co., Ltd.—Registered September 2nd. Capital, £1,400. To acquire the business carried on by A. E. Tutte at Hampton, Middlesex. Directors: A. E. Tutte and P. H. Hutchinson. Regd. office: 39, High Street, Hampton, Middlesex.

A. L. Filby, Ltd.—Registered September 5th. Capital, £5,000. Electrical engineers and general electrical installation contractors, etc. Directors: A. L. Filby (permanent managing director) and Margaret Filby. Regd. office: 4, John Street Market, Bradford.

C.M.C. (Electrical), Ltd.—Registered September 5th. Capital, £1,000. Electricians, radio, electrical and mechanical engineers, etc. H. U. V. Scrutton is permanent governing director. Regd. office: Caterham, Surrey.

Electrical Rewinds (Burslem), Ltd.—Registered September 5th. Capital £2,000. Directors: J. H. Bates (permanent) and Mrs. E. Bates. Regd. office: 67, Bournes Bank, Burslem, Stoke-on-Trent.

Brightglow (Cardiff), Ltd.—Registered August 29th. Capital, £1,000. Electrical, mechanical and radio engineers, etc. Directors: D. A. Lyster and G. E. Epsom. Regd. office: Penarth Road, Cardiff.

Jerome K. Jerome (Gosport), Ltd.—Registered August 30th. Capital, £100. To acquire the business of wireless and electrical engineers carried on by N. Jerome at 11, North Cross Street, Gosport. Directors: T. Jerome and N. T. Jerome. Regd. office: 11, North Cross Street, Gosport.

Denis Electric, Ltd.—Registered September 8th. Capital, £1,000. To acquire the business of radio and electrical engineers, etc., carried on by D. McGrath and F. W. Kempton as "Denis." Permanent directors: F. W. Kempton, D. McGrath and A. H. Pole. Regd. office: 179, Dawes Road, S.W.6.

Increases of Capital

Compoflex Co., Ltd.—Capital increased by £10,000 beyond the registered capital of £25,000.

F. Bradley, Ltd.—Capital increased by £3,500 beyond the registered capital of £1,500.

Humota, Ltd.—Increased by £1,000, in £1 shares, beyond the registered capital of £1,000.

Silent Transport, Ltd.—Increased by £24,900 beyond the registered capital of £100.

Southern Battery Co., Ltd.—Increased by £6,000 beyond the registered capital of £4,000.

North East Wires, Ltd.—Increased by £14,000 beyond the registered capital of £6,000.

Hivac, Ltd.—Increased by £42,500 beyond the registered capital of £7,500.

F. O. Coward, Ltd.—Increased by £5,000, beyond the registered capital of £2,500.

Bennett Power Products, Ltd.—Capital increased by £25,000 beyond the registered capital of £10,000.

Frig Spares, Ltd.—Increased by £8,000, beyond the registered capital of £2,000.

Liquidations

Hayward Turbine Engineering Co., Ltd.—Winding up voluntarily. Liquidator, Mr. J. Lewin, 28, Maddox Street, London, W.1. A statutory declaration of the solvency of the company in accordance with Section 230 of the Companies Act, 1929, has been lodged with the Registrar of Joint Stock Companies.

Bankruptcies

E. Marrow, carrying on business at 123, King Street, Knutsford, Ches., under the style of Marrows Radio Service, electrical and radio engineer.—First meeting held September 16th at 20, Byrom Street, Manchester. Public examination October 10th at the Court House, Quay Street, Manchester.

C. Peacock, residing at 93, Lowther Street, York, and carrying on business at 51, Gillygate, York, electrical engineer.—Supplemental dividend of 16s. 1d. in the £ (making 20s. in the £) and 4 per cent statutory interest, payable September 23rd at the Official Receiver's Office, Lantern Tower Chambers, Coppergate, York.

"Orders out of Chaos"

UNDER this title the Midland Electric Manufacturing Co., Ltd., has produced a scheme for dealing drastically with the mass of orders which it sees no prospect of executing within a reasonable time on account of the difficulties under which it is operating.

The company says that at present the demand for its products exceeds supply in the ratio of about 5 to 1 and it is taking from twelve to eighteen months to execute orders. If it were not for shortages of materials and restrictive controls it would be possible to increase present production by 75 per cent. It is believed that most wholesalers, desiring to obtain a share of any supplies which are going, have been placing regular orders with a view to securing some deliveries at a future date. This "queue mentality" is said to have cluttered up the company's order books and has destroyed the true relationship between demand and supply.

It is therefore proposed to make a clean sweep as the only possible remedy and all unexecuted orders for standard material (not those for special material and spare parts) outstanding on September 30th are to be cancelled and a system is to be instituted by which production will be allocated to customers on the basis of their past business. The reasons are fully set out in a little humorously-illustrated booklet and with it is a menorandum to the company's regular customers setting out the total volume of goods which can be allotted to them for the year beginning on October 1st. Every endeavour will be made to supply goods specified by the wholesaler but this cannot be guaranteed.

Accompanying these documents are new illustrated catalogues with up-to-date prices—No. 284 covering motor control gear and No. 285, switchgear; there is also a net trade price list.

New Companies

Jordan & Sons, Ltd., company registration agents, have resumed the publication of classified statistics relating to the registration of companies. The list shows that in 1945 eight public companies (total capital £30,100) and 406 private companies (£1,759,850) were registered in the "Electricity (Radio), Gas and Water" group. In 1946 in this group there were three public companies (£2,600) and 1,095 private companies (£3,297,270) and in the first six months of this year two public companies (£260,000) and 458 private companies (£2,207,825.)

STOCKS AND SHARES

THE violence of the slump in stocks and shares which took place three weeks ago, was followed by a recovery which partially restored the losses then incurred. It is true that the quotations of last May were well above those now current, but the latter are very considerably better than the lowest levels touched during what is now called the semi-panic time. Why there should have been so substantial a measure of support from investment even before the coal strike was settled, and when the financial crisis of the country had in no way abated, it is difficult to say.

Money for the Markets

It is common knowledge that a number of people realised their holdings early in August, when the first symptoms of the slump became apparent and, in all probability, part of this money was waiting to find a permanent home. The recent rally found a less amount of stock available than might have been expected having regard to the steepness of the previous fall. In other words, it is now obvious that the declines were in many cases out of relation to the volume of stock and shares sold, and that the marking-down process was partly a precautionary measure, rather than an indication of heavy sales.

All-Round Rises

The chief rises since a week ago have naturally accrued to the prices which suffered the most in the previous collapse. Tube Investments, 5⅞ and De la Rue 50s., are conspicuous in the list. Associated Electrical Industries 77s. 6d., Mather & Platt 50s., Johnson & Phillips 64s. 6d., Siemens 30s. 9d. and Metal Industries "B" 46s. 3d. have followed the rising trend. Crompton Parkinsons are better at 47s., Automatic Telephones at 55s. and British Aluminium at 42s. 6d. Amongst the lower-priced shares, Brush Electrical strengthened to 6s. 3d., British Rola to 3s. 9d., Vactric to 12s. 6d. The Home Railway market is stagnant, but British Electric Traction deferred gained 70 points, to 1145. Thomas Tilling rose 5s. to 62s. 6d.

Coal Settlement Effect

Radio industry gains include Cossor 20s., E. K. Cole 17s. 6d., "Emi" 20s. 6d. and Scophony 6s. 3d. Cable & Wireless stocks both recovered; the ordinary rose 4 to 151½, the preference 5 to 113½. Telegraph Constructions 44s. 6d., English Electrics 55s., Electric Components 13s. 6d., are amongst the harder prices. Shares in the "heavy" section responded to the end of the coal strike with a general rise; Babcock & Wilcox strengthened to 66s. 6d. Political influences led to small declines in Madras Electric to £2 and Palestine Electric to 32s. 6d. A 5s. gain lifted Victoria Falls ordinary to 5⅛. Home electricity ordinary shares show no changes of any consequence.

Preference Shares

The shake-out in markets served to reduce to some extent the prices at which good-class preference shares can be obtained. During the last few weeks, the investor has had an unusually wide choice in this market. For cases in which he (or she) is content to take 4 per cent on the money, it may be of service to set out a short list of what is obtainable. Taking seven electricity supply companies whose preference shares can be bought at the present time, it will be seen that the returns range from £3 16s. 0d. per cent to nearly 4½ per cent on the money. The final column in the following table gives the proposed compensation price, which, it will be noticed, is above that at which shares can be purchased in the market.

Preference	*Price*	*Divd.*	*Yield* £ s. d.	*P.C.P.**
Clyde Valley 6%	30/–	M.N.	4 0 0	31/10
Lincolnshire and Cent. 4½% ..	21/–	J.D.	4 5 9	22/8
Metropolitan 4½%	22/9	J.J.	3 19 1	24/7
Midland County 6%	29/–	M.S.	4 3 3	31/6
North Met. 6% ..	29/3	A.O.	4 3 0	31/7
North Met. 4% ..	21/–	A.O.	3 16 2	22/5
Woking 7% ..	31/6	M.S.	4 9 0	33/–

* Proposed compensation price.

In addition to preference shares that can now be bought at reasonable prices, a certain amount of debenture stock is also obtainable. London Power 3¼ per cent debenture, January and July interest, is on offer at 96, and the compensation price is 103. North Eastern Electric and Northampton 3½ per cent debentures can both be bought at 96, the P.C.P. in their cases being 102½, while North Metropolitan Power Station 3¼ per cent at 95 has 101 as the compensation price.

Ericsson Premium

Ericsson Telephone shares are practically unchanged at 40s., but the newly-issued 3½ per cent debenture stock, which came out at 100, is now 104½ to 105. The stock was offered at what seemed to be anything but a propitious moment; in spite of this, however, the issue secured over-subscription, and now there are buyers on the basis of the above quotation.

Strand Electric

Strand Electric Holdings Limited has increased its dividend from the 12½ per cent paid in each of the three years 1944-46 inclusive, to 17½ per cent for the year to April 30th last. The net profit of £31,575 compared with £19,983 in the previous twelve month. Under normal conditions, the figures would have strengthened the price, but, owing to the abnormal circumstances of the time, it went back to 10s., showing a yield on the basis of the 17½ per cent dividend of 8¾ per cent. This had the effect of bringing in a few buyers, and Strand Electrics rose to 12s. At this, the yield comes to 7¼ per cent on the money. The company was formed eleven years ago to acquire the issued capital of Strand Electric and Engineering Co., Ltd.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *may be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

1941

BRITISH Thomson-Houston Co., Ltd. (General Electric Co.).—" Aircraft supercharging arrangements." 13418. October 17th, 1941. (591761.)

1942

W. Jessop & Sons, Ltd., and D. A. Oliver.—" Manufacture of ferro-magnetic material." 4505. August 26th, 1941. (Divided out of 572409.) (591762.)

1943

Holophane, Ltd. (Holophane Co., Inc.).—" Processes and apparatus for tempering glass." 9267. June 9th, 1943. (591764.)

Standard Telephones & Cables, Ltd.—"Radio detecting systems employing a common antenna structure for transmitting and receiving." 19141. February 14th, 1942. (591853.) " Modulator system." 20394. August 6th, 1942. (591765.)

General Electric Co., Ltd., and E. Friedlander.—" Electrical protective systems for use with synchronous motors." 20675. December 10th, 1943. (591766.)

1944

Standard Telephones & Cables, Ltd.—" Phase-shifting arrangement for oscillating electrical currents." 3112. April 3rd, 1943. (591854.) " Antenna arrays." 8597. March 10th, 1942. (591855.) " Direction finding systems." 20399. April 23rd, 1942. (591867.)

Scophony, Ltd., and G. Wikkenhauser.—" Radiolocation." 9314. May 15th, 1944. (591856.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—" Methods of producing highly reflecting metallic films." 12277. June 28th, 1944. (591807.)

G. E. F. Fertel and C. S. Wright.—" Electrical measurements in h.f. systems." 14699. August 1st, 1944. (591778.)

Standard Telephones & Cables, Ltd., and C. W. Earp.—" Radio direction finding systems." 15586. August 15th, 1944. (591668.)

Soc. Anon. pour l'Industrie de l'Aluminium.—" Cells for the electrolytic refining of aluminium." 15959. August 23rd, 1943. (Cognate application 15960/44.) (591779.)

Westinghouse Electric International Co.—" Electro-deposition of metals." 17874. October 16th, 1943. (591783.)

Indiana Steel & Wire Co.—" Process and apparatus for electroplating." 18166. August 19th, 1943. (591866.)

Allmanna Svenska Elektriska Aktiebolaget.—" Contact protecting arrangement in electric interrupters." 20710. November 5th, 1943. (591790.)

General Electric Co., Ltd., D. O. Walter and D. C. Espley.—" Synchronizing of alternating voltage sources." 20742. October 25th, 1944. (591791.)

Philco Radio & Television Corporation.—" Protective device." 23974. November 30th, 1943. (591870.)

1945

Philco Radio & Television Corporation.—" Protective circuits for intermittently operable electrical circuits." 2924. November 2nd, 1943. (591874.)

B. W. Benbow.—" Electrical contacting equipment." 3026. January 31st, 1944. (591826.)

Electromagnets, Ltd., W. E. Box and J. T. Claridge.—" Magnetic separators using permanent magnets." 3678. February 14th, 1945. (591831.)

American Metal Co., Ltd.—" Indium electroplating." 5140. March 15th, 1944.(591834.)

Worthington-Simpson, Ltd., J. Southern and C. M. Cherrie.—" Electric motorized pump units." 5162. March 1st, 1945. (591835.)

A. J. Coghlan.—" Means for locating earth faults or the like in electric cables or conductors." 7722. April 19th, 1944. (591725.)

Imperial Chemical Industries, Ltd.—" Electroplating apparatus." 8074. March 30th, 1944. (591877.)

Standard Telephones & Cables, Ltd.—" Pulse communication systems." 9320. April 20th, 1944. (591884.)

Lumalampan Aktiebolag.—" Holder device for tubular electric lamps." 10377. January 19th, 1945. (591676.)

Automatic Telephone & Electric Co., Ltd., and G. T. Baker.—" Electrically operated calculating equipment." 11051. May 2nd, 1945. (591680.)

Ferranti, Ltd., A. L. Chilcot and M. K. Taylor.—" Electric discharge tubes." 11054. May 2nd, 1945. (591681.)

Allmanna Svenska Elektriska Aktiebolaget.—" Operating device for pneumatically actuated gas-blast electric circuit breakers." 11078. May 11th, 1944. (591682.) " Compressed air-blast circuit breakers with parallel resistance." 12027. May 20th, 1944. (591741.)

Oldham & Son, Ltd., and A. O. Roberts.—" Electric accumulator lamps." 11295. May 3rd, 1945. (591689.)

Standard Telephones & Cables, Ltd., and

I. R. Worsley.—" Electric oscillation generators." 11347. May 4th, 1945. (591692.)

Humber, Ltd., and J. E. P. Burge.—" Electrical distribution systems." 11533. May 7th, 1945. (591700.)

Express Lift Co., Ltd., S. T. Hunt and J. N. Welch.—" Electrical systems of control for lifts." 11550. May 7th, 1945. (591701.)

Foster Transformers & Switchgear, Ltd., and C. R. E. Legg.—" Apparatus for electric arc welding." 11561. May 7th, 1945. (591702.)

E. K. Cole, Ltd., L. W. D. Sharp and H. Hunt.—" Tuning arrangements for radio receivers." 11673. May 10th, 1945. (591706.)

W. S. Percival.—" Transmitting and receiving circuits such as for television." 11695. May 10th, 1945. (591707.)

F. Majer.—" Electrically driven hair-cutting machines." 11737. May 10th, 1945. (591709.)

British Insulated Cables, Ltd., J. C. Quayle and P. Jones.—" Tool for localized electric high-frequency heating of insulating materials." 11969. May 12th, 1945. (591738.)

Igranic Electric Co., Ltd.—" Control systems for induction motors." 12167. May 27th, 1944. (591750.)

Mitchel Electric, Ltd., and W. R. M. Mitchell.—" Electric heaters." 12250. May 16th, 1945. (591752.)

Humber, Ltd., and J. E. P. Burge.—" Joints for sectionalized electric distribution systems." 12546. May 18th, 1945. (591711.)

Ferranti, Ltd., M. K. Taylor, F. C. Williams and R. H. A. Carter.—" Switching means either for allowing a plurality of cyclically-operative thermionic systems to operate singly in a predetermined order or for allowing the interrupted operation of only a specific one of them." 12809. May 22nd, 1945. (591802.)

Patent Law Reform

Committee's Final Report

By "Pagent"

RECENTLY there has been issued the Third and Final Report of the Board of Trade Departmental Committee on Patents. The principal recommendations of the Committee are summarized below.

An assignee of an invention should be entitled to apply for and secure a patent. Where both an employer and an employee are entitled to the benefit of an invention and the situation is not covered by a written contract the Court should be able to make an apportionment. Provided the parties agree to the course, the Comptroller should be empowered to determine a dispute between them.

As regards term and renewal fees a patent should date from the filing of the complete specification, but the effective priority date as regards anticipation should be that of the provisional specification or foreign specification (in Convention cases) on which the complete specification is based. The official novelty search should be carried to the date when the complete specification was filed.

Provided there is no intervening publication, grant of patent should not be objected to on the ground of disconformity.

As regards third party rights the Court should retain complete discretion regarding the terms of re-grant of a patent. Standard conditions, reasonably protecting third parties who have made use of an invention previously protected by an expired patent in good faith, should be clearly and unambiguously stated. They should be generally used except in special cases. Special circumstances may be brought to the attention of the Court. The conditions should deal specifically with the subject-matter claimed in the patent. Third parties who knowingly make use of that subject-matter when they might have known of an application for a re-grant should be regarded as without merit, but those who could not have known should be protected up to the liability incurred.

The emergency powers of the Crown should be incorporated in the Acts. Those who lose the benefit of their agreement regarding use of a patented invention or of the subject-matter of a pending application, owing to Crown user, should proportionately benefit from the compensation paid by the Crown in respect thereof. Provisions as to Crown user should apply to patentees or their licensees employed as contractors by Government Departments. Issues of validity or infringement should be decidable in any proceedings under the Section of the Acts relating to Crown user.

Claims for substances prepared or produced by chemical processes or intended for food or medicine should not be limited, as at present, to the particular processes described or their obvious chemical equivalents, but substances occurring in nature should be excluded from the claims. Mere admixtures, the properties of which are the aggregate of

the properties of the constituents, should not be patentable.

A co-owner of a patent should be entitled to assign the whole or part of his interest therein only with the consent of his co-owners or of the Comptroller.

In convention cases it should be permissible to base a British patent application on applications filed in more than one convention country, and to include features not contained in the basic specification—taking the British filing date for them. A patent should not be revoked because of disconformity between the basic and the British specifications. Convention specifications should be laid open to public inspection in a similar way to non-convention specifications as regards date.

Exclusive licensees should be able to take action in their own names for infringement and to obtain normal relief. A potential manufacturer should be able to obtain a declaratory judgment that the article to be manufactured would not infringe a patent in a case of doubt and if in fact it would not so do.

A single central body should be formed to take over state-owned or state-subsidized inventions, to estimate their potential value, and to arrange for their development and use in industry as a public asset.

Three months extension of time should be allowed for filing a complete specification after a provisional.

Comptroller and Anticipation

The Comptroller should be empowered to require amendment of or to revoke a pending patent where an anticipatory document is brought to his notice otherwise than by the official novelty search or in opposition or revocation proceedings. Patents protecting inventions liable to infringe earlier apparently valid grants should be notified to the public by specific reference.

In cases of prior grant the amount of allowable amendment of the later specification to meet the earlier one should be increased and such amendment should not be required until the grant of the earlier patent. Up to fifteen months from the date of the filing of a complete specification should be allowed for putting it in order for acceptance.

Subject to the consent of the applicant, an unaccepted complete specification of a void application should be printed if the Comptroller thinks it desirable.

It should be possible to lodge an opposition up to three months from the date of publication of an accepted specification.

Refusal of grant should not be made where publication has taken place consequent on breach of confidence.

Wrong claiming of a convention priority date should of itself have no worse result than the loss of the said convention priority date.

A patent unwittingly issued to a deceased applicant or to a non-existent company should be revocable and re-grantable to the successors of the said parties.

The rights conferred by a patent grant should be specifically stated in the Acts.

Others than the patentee should be able to pay renewal fees to the Patent Office in respect of a patent.

Extension of Period

It should be made clear in the Acts that patents are not to be precluded from obtaining extensions of time for merit as well as for war damage. Exclusive licensees should be able to apply for such extensions. In the case of a patent of addition based on a provisional specification the main patent should be able to be of later date than the patent of addition provided its complete specification be not filed later than the complete specification of the patent of addition.

If the subject-matter in an application for a patent of addition is not anticipated, even if it contains no inventive step beyond what is contained in the basic patent, a patent should be granted.

In an application for restoration of a jointly owned patent it should not be necessary to join co-patentees. No additional fees should be payable for including patents of addition in application for restoration.

When payment of a sealing fee has been inadvertently omitted the relevant patent application should be restorable.

Omission from advertisement of details of an amendment by the Comptroller after grant should be made a permanent feature of the Acts. In the Acts it should also be stated as a permanent feature that it is unnecessary to advertise applications to indorse patents "Licences of Right," and that where a request is made to refuse indorsement this may be made at any time before the effecting of the indorsement. In cases where patents are indorsed "Licences of Right" and the indorsements are cancelled, unpaid portions of the renewal fees should be paid within reasonable time.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Bristol.—September 30th. Public Works Maintenance Committee. Self-starting synchronous clock control for street lighting. (September 5th.)

Bury.—September 22nd. Borough Council. Installation of lighting equipment in the public library. (September 12th.)

Edinburgh.—September 30th. Electricity Department. P.i. cables for twelve months. (September 5th.)

Manchester.—September 22nd. Electricity Department. Accessories for use with domestic appliances for twelve months. (September 5th.)

Plympton St. Mary.—October 17th. R.D.C. Domestic apparatus. (See this issue.)

Poplar.—October 9th. Borough Council. Nine 500-kVA transformers, 6,000/415-V. (September 5th.)

Seaton Valley (Northumberland).—U.D.C. Electrical installations in 80 houses, Klondyke site, Cramlington. Surveyor, Council offices, Seaton Delaval.

Silsden.—September 30th. U.D.C. Gas Department. Electric lift at Gas Works. (September 12th.)

Southport.—September 27th. Corporation. Transformers. (September 12th.)

Wakefield. — September 27th. R.D.C. Electrical installation in the Council Offices. Surveyor, Council Offices, 18, St. John's North.

Winchester.—September 27th. Corporation. Complete central-heating system for the Guildhall. (September 5th.)

Orders Placed

Bradford.—Corporation. Accepted. Electric lift at St. Luke's Hospital (£2,149).—Shorts (Lifts), Ltd.

Carlisle.—Electricity Committee. Accepted. Cable in connection with changing over from 3 to 11 kV (£30,290).—Scottish Cables.

Heston & Isleworth.—Corporation. Accepted. Conversion of radio receivers and equipment in the Lampton area.—National Radio Service & Television Co.

Southport.—Accepted. Installation of electric lighting and heating in 30 houses on the Lytham Road site (£1,076) and 20 houses on the Radnor Drive site (£720).—Brooks & Southworth.

Swindon.—Electricity Committee. Accepted. E.h.v. switchgear (£1,395). Ferguson, Pailin. L.v. switchgear (£191).—English Electric Co. Transformer (£503).—Bryce Electric Construction Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Arundel.—Toy factory for Burgess Bognor Bazaar, Waterloo Square, Bognor.

Ashbourne.—Houses (50), Park estate for U.D.C.; A. Adlington, Ltd., builders, Tupton, near Chesterfield.

Barking.—Additions to works for C. & M. Engineering Co., Ltd.; W. T. Gunson & Son, 10, Marsden Street, Manchester.

Bath.—New Southdown School; A. J. Taylor & Partners, 4, Bridge Street.

Bellingham (Northumberland).—Houses (100), North Tyne area; R.D.C. surveyor.

Bethesda.—Works and foundry for Cooper, Webb, Jones & Co.; Pochins (M/C), Ltd., Dunham Mount, Altrincham, builders.

Bishop's Stortford.—"Utility" permanent houses (72), Havers Lane site (£94,915), for U.D.C.; Clayden Contractors, Ltd., Spelbrook, Sawbridgeworth.

Boldon.—Junior and infants' school south of the River Don for Durham C.C.; county architect, 34, Old Elvet, Durham.

Bolton.—Reconstruction of mill; Robert Farnworth, Ltd., Nelson Street.

Bradford.—Extensions, Empire Works, Thornbury; Crofts, Ltd.

Broughton.—Extensions, motor showrooms and works, Bury New Road and Upper Camp Street for H. E. Nunn & Co., Ltd.; N. Jones, Son & Rigby, architects, 271, Lord Street, Southport.

Bury St. Edmunds.—Additions, St. Mary's Hospital, for West Suffolk C.C.; county architect, Westgate House.

Chadderton.—Houses (46), Melbourne Street site for U.D.C.; Green & Co., builders, 19, Moira Street, Moston.

Christchurch (Mon.).—Nurses' quarters at Lydia Beynon Maternity Hospital; Colin L. Jones, county architect, Queen's Hill, Newport, Mon.

Coventry.—Bakery, Torrington Avenue; Co-operative Wholesale Society, Ltd.

Darlington.—Factory for Darlington Ice & Cold Storage Co., Feethams.

Durham.—Dry cleaning works, Neville's Cross, for Co-operative Laundries, Ltd.; C.W.S. Architects' Department, 90, Westmorland Road, Newcastle-on-Tyne.

Edinburgh.—Reconstruction of sailors' home, Tower Place (about £30,000); British Sailors' Society.

Enfield.—Shops (20), with living accommodation, Bullsmoor Lane; R. W. King (Builders), Ltd., Broadfield, Gomshall, Surrey.

Falkirk.—Workmen's baths, offices and other buildings for Falkirk Iron Co.

Frodsham.—Remand home for girls, Norley Bank; A. F. Illidge & Son, builders, 2, Main Street.

Glasgow.—Factory on Queenslie Industrial estate; architect, Scottish Industrial Estates, Ltd.

Gosport.—Adaptations at Park House, for hospital; S. Low, county architect, The Castle, Winchester.

Morecambe.—Extensions to nurses' home, Queen Victoria Hospital; W. J. Morley & Son, 269, Swan Arcade, Bradford.

Newcastle-on-Tyne.—Conversion of Jesmond Towers into secondary school for R.C. authorities; T. Curry & Son, builders, Meldon Street.

Newcastle-under-Lyme.—Departmental Stores, market site for Debenham's, Ltd.; W. T. Overbury, architect, Rodney House, Cheltenham.

Northampton.—Houses (74), Dallington Fields estate (£74,059); Corporation Public Works Department.

Northenden.—Additions, Sirius works, Brodnor Road, Holden & Brooke, Ltd.; R. Partington & Son, Ltd., Lodge Street, Middleton.

Norwich.—Four-storey factory, Foundry Bridge site; Coleman & Co., Ltd., Wincarnis House, Prince of Wales Road.

Oldham.—Houses (44), Rowan Avenue site; Greenwoods Building Industries, Ltd., Salem Works, Lees Road.

Portsmouth.—Reconstruction of factory, Baker Street, Landport for Weingarten Bros., Ltd., Milton; Ernest J. Thomas, Coronation House, King's Terrace.

Radcliffe.—Extensions, Tower Dye Works for D. & H. Dyers, Ltd.; E. Butterworth & Sons, builders, Butterworth Street.

Rotherham.—Pithead baths, Denaby Main Colliery, for N.C.B.; P. P. Taylor (Doncaster), Ltd., South Parade, Doncaster.

Sandown-Shanklin.—Houses (60), and bungalows (12), Green Lane, Shanklin; surveyor, Urban Council Offices, Sandown.

Seaham Harbour.—Factory for Jackson's, Ltd., tailors, Newcastle; Cackett, Burns Dick & McKellar, 21, Ellison Place, Newcastle.

South Kilburn.—Block of 30 flats, Chichester Road for Willesden B.C.; Mizen & Woodford, Ltd., builders, 70, Lordship Lane, S.E.22.

South Shields.—Factory, Bede estate, for Harton Dyeworks, Ltd.; T. A. Page, Son & Hill, 75, King Street.

Stockport.—First portion, junior school, Broadstone Hall Road, South Reddish (£16,000); C. H. Godfrey & Son, Ltd., builders, Bowling Road, Gorton, Manchester, 18.

First portion, infants' school, Bridhall estate, borough education architect, Town Hall.

Extensions, confectionery works, Newark Road, Reddish, for Co-operative Wholesale Society, Ltd., 1, Balloon Street, Manchester.

Stoke-on-Trent.—Rebuilding factory premises, London Road; Dunlop Rubber Co., Ltd., Fort Dunlop, Birmingham.

Stretford.—Flats (64), Winchester and Brompton Roads (£83,200); H. C. Scott, quantity surveyor, 3, St. James' Square, Manchester, 2.

West Ham.—Rebuilding factory and warehouse, Marshgate Lane for Andrew Weir & Co. (Liverpool), Ltd.; A. J. Fowles, 7, Burlescombe Road, Thorpe Bay, Essex.

Whitley Bay.—Factory for making farm implements; R. A. Gofton & Sons, builders, Front Street, Monkseaton.

Trade Marks

THE following applications have been made for the registration of trade marks. Objections may be entered within a month from September 10th:—

Design (globe encircled by frame carrying insulators). No. 648,961, Class 6. Constructional ironwork for telegraphic, telephonic and electric power lines.—B. Birks & Co., Ltd., Allbutt Street Works, Cradley Heath, Staffs.

WELDCON. No. 649,427, Class 8. Hand tools for dressing electric resistance welding electrodes. No. 649,428, Class 9. Control apparatus for use in the timing of electrical welding apparatus.—Welding Controls, Ltd., 1A and 24, High Street, Kempston, Beds.

SEMOCO. No. 648,585, Class 9. Instruments and apparatus for use in the production of sound wave records and for the reproduction of sound waves from records, apparatus for reproducing sound from electric currents, and parts not included in other classes; electric switches, switchboards (complete) and regulators included in Class 9.—Small Electric Motors, Ltd., Churchfields Road, Beckenham.

RUBANOX. No. 643,072, Class 11. Encased elements for electrical heating apparatus; heating apparatus and appliances, cooking ovens, cooking stoves, furnaces (other than for experimental or testing purposes), boilers (not being parts of machines), and cooling vats for furnaces.—Société Anonyme des Appareils G.A.L., 80, Boulevard Bourdon, Neuilly-sur-Seine, France. Address for service: c/o Marks & Clerk, 57/8, Lincoln's Inn Fields, W.C.2.

KEROGLOW. No. 648,239, Class 11. Installations for lighting, heating, steam generating, cooking, refrigerating, drying, ventilating and water supply.—Lion Stamping Co., Ltd., 35, Marshgate Lane, Stratford, London, E.15.